RAILROAD GAZETTE

FRIDAY, FEBRUARY 21, 1902.

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Contributions

Slag Ballast.

Erie Railroad Company,
Bradford, Pa., Feb. 10, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

The writer wishes some information concerning slag ballast, the best methods for unloading and handling it until under ties; what kind of tools should be used in handling, and the minimum depth to be placed under the tie to give the best results. What is the behavior of slag ballast under heavy traffic, and how does it behave in wet cuts? How many feet of track per man per day can be raised and put in good line and surface?

W.

Alternating Current in Railroad Shops.

Boston & Maine Railroad,
Boston, Feb. 11, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In your article entitled "Shop Improvements at Jackson, Mich.," in your issue of Feb. 7, page 92, I notice the following statement: "So far as we know, this is the first railroad shop where alternating current has been used exclusively." In this connection I would call your attention to the fact that we have been running our shops at Concord, N. H., since November, 1897, including cranes, on the two-phase alternating system, which would make your above statement subject to revision.

HENRY BARTLETT, *Supt. Motive Power.*

[Of course, we should have known this fact, for we printed a very thorough description of the Concord shops in our issues of Feb. 4, March 4 and April 1, 1898. In the last of these the electrical equipment is described. —EDITOR.]

Northern Pacific Railway Company,
St. Paul, Minn., Feb. 12, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In your remarks on "Shop Improvements at Jackson, Mich.," in your issue of Feb. 7, 1902, I note that you state that so far as you know this is the first railroad shop where alternating current has been used exclusively.

In view of this statement you will no doubt be interested to learn that the Northern Pacific Railway Co. has had in operation, since the fall of 1899, at its Brainerd, Minn., general repair shops an alternating current power plant. We are using the Westinghouse two-phase system with 220-volt motors and 110-volt lamps.

A part of the lighting circuit extends to the freight and passenger depot about one-half mile from the power-house, while another part extends to the company hospital over a mile distant.

The power house is equipped with five Babcock & Wilcox boilers of 200 h.p. each, one at 180 k.w., one 150 k.w., and one 50 k.w. generator, belt-connected to two Ball & Wood and one Ideal engine. The voltage of generators is 220 and this is used for the shop circuit, but is transformed to 2,200 volts for the two lighting circuits mentioned above and then transformed to 110 volts for the lights.

The motor equipment consists now of group and individual machine motors, two traveling cranes and one transfer table.

The service requirements of this whole system have been very severe and yet under the hardest kind of work the results have been very gratifying. Improvements are now under way for the operation of another of our shops by this system and from past experience it will no doubt be very satisfactory.

The work of the traveling cranes and transfer tables has been remarkably successful and has proven the adaptability of this system to such work.

R. P. BLAKE, *Mechanical Engineer.*

The Middletown (Conn.) Drawbridge.

Sault Ste. Marie, Ont., Feb. 2, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I reply to Mr. Jarvis' criticism in your issue of Feb. 7, as follows:

In writing, my object was to give a fair report of an interesting piece of engineering work, rather than to advertise the engineers. At the end of my report, however, is a brief statement giving the names of the principal men connected with the work. This statement reads as follows:

"At the time this bridge was built, the Chief Engineer for the Berlin Iron Bridge Co., who were contractors for the work, was Mr. Charles M. Jarvis. The preliminary estimates with number and length of spans, were determined in the estimating department of that company. The matter was then turned over to the writer, who was their assistant engineer. On going over the entire design the writer found it necessary to change the form and outline of both the draw and the fixed spans, and to refigure and reproportion the members He then proceeded to design the machinery, and all other structural details connected with the work. The fixed spans required twenty-five sheets of drawings, and the draw span eighty-three sheets. Mr. Graves, of Hartford, was in direct charge of the foundation work, and John Devin was erection foreman. The owners are the Middletown & Portland Bridge Co., of which F. L. Wilcox is Treasurer."

As stated above in my original report the bridge was built by the Berlin Iron Bridge Co., of which Charles M. Jarvis was President and Chief Engineer. Mr. Jarvis' time was mostly given to the duties of President. The surveys, soundings, etc., were made by Mr. Graves, and the original strain sheets by Mr. Chase, who was employed in the estimating department. The original masonry plans were made by Mr. C. V. Pendleton, but they were afterwards revised and redrawn.

The papers were then turned over to the writer, who was squad foreman or assistant engineer in the drafting department. The duties of the squad foreman were to check the strains, design all details, and all machinery, as well as to direct the making of shop drawings. The papers received in the drafting department relating to the superstructure were, a show plan, 24 in. by 36 in., made of single heavy lines without sizes, and a set of four size and section sheets, size 8 in. x 13 in. These five blue prints are all that were received from the estimating department. In taking up the work, it was necessary that I should first criticise what had already been done, and check over the strange sheets. This resulted in the following changes:

The top chord of draw span between the inclined end posts was changed from a curve to a straight line. This arrangement allowed the use of riveted chord splices at one side of the panel point, instead of splicing on the pins, by means of pin plates. The tension members in the top chord over the tower, and in the two adjacent panels, were originally shown as riveted members to correspond with the other top chords. These were changed to eye-bars. These two changes in the draw span altered the whole outline of the upper chords, from end to end.

Other changes in the draw span were as follows: The end floor beams were changed from plate to box girders. The loading beams over the drum were changed from 15-in. beams to 24-in. box girders. Sway bracing was changed from double to single rods throughout. Instead of line shafting to operate the end lifts from one central motor, shafting was discarded, and two separate motors used instead. An overhead platform was provided for the operator's house, instead of placing house on the roadway level outside of the truss.

The bridge throughout was provided for two lines of sidewalk, instead of only one. In the four fixed spans, the second and third panel in each span was changed from a double subdivided panel to single panels. This required two additional heavy posts in each truss, and entirely changed the arrangement of the end panels, and the stresses in the members.

Therefore, as stated in my original report, "the form and outline of both draw and fixed spans" were changed, so it became necessary to "refigure the stresses and reproportion the members."

It is the practice of some bridge companies to have general sketches made in the estimating department by the same men that make the strain sheets. This is as it should be. A structure is not more than half designed till general detail plans are made. This was not the practice, however, with the Berlin Bridge Co. The estimating department furnished strain sheets only, leaving general plans to be made in the drafting department by the squad foreman. A complete set of these general detail plans were made by me and have already been sent to the *Railroad Gazette.* From these general plans, the material was ordered and the shop drawings made, by a squad of six draftsmen, working under the direction of the writer as foreman.

After completing the general drawing of the riveted work, I proceeded to design the machinery, and make designs and plans not only for all turning and end lifting machinery, but also for latches, signals, river lights, submarine cables, floor aprons, safety gates, rail adjusters, electric lighting, etc. On account of the fall of the Middletown abutment, and the extra cost of rebuilding it, some of the above machinery was omitted.

After the bridge was finished and thrown open to travel, the Middletown abutment containing 815 cu. yds. of masonry, failed, and had to be taken down and rebuilt. It was 31 ft. 6 in. high to coping, and with its wing wall stood on 171 piles. False work was again placed under the bridge, and the stone abutment taken down one layer at a time. The stone was carefully piled on the river bank and was used again in rebuilding. This work was in charge of Mr. E. D. Graves, of Hartford, who was substructure engineer. The taking down of large masonry abutments just recently built is quite an unusual occurrence, and Mr. Graves was able to secure much valuable data on the cost of this kind of engineering. Mr. Jarvis states that Mr. Edward was chief engineer of the work. This is not correct as he had nothing whatever to do with the Middletown bridge, either in the office or in the field.

In a letter recently published by Mr. Graves in the *Engineering News*, he too claims for himself the distinction of being Chief Engineer of the Middletown Bridge. This statement is also incorrect. The fact is that Mr. Jarvis was Chief Engineer, but the important work was turned over by him to others. It was evident that there was much need for an acting chief engineer. Several of the younger men were wishing for the position, and the result was much rivalry and jealousy. Later on Mr. Edward secured the appointment.

Somewhere among my papers, I have a testimonial given me several years ago, and signed by Mr. Jarvis, and the other officers of his company certifying to the fact, that I had responsible charge of office work. His present criticism does not appear to agree with his previous letter.

In my original report it was not the intention to give the credit for the Middletown Bridge to any one individual. Like every other important engineering work, it was the result of many minds. My report was a fair description of the work and gave the names of the principal men connected therewith.

H. G. TYRRELL.

The Locomotive Conference in Calcutta.

The following extracts are from *The Engineer* (London), Jan. 17, being part of a report from a Calcutta correspondent, writing on the above subject:

The recent outcry about contracts for locomotive engines for India being let to American and German firms resulted in the Secretary of State for India arranging for a conference of Indian locomotive superintendents, to which he appointed as President, Mr. Wolley-Dod, F. C. H., M. Inst. C. E., a retired engineer of the Indian Public Works Department living in London.

The conference assembled in Calcutta, on Monday, Dec. 9, and sat daily for some five hours, completing its final session on the 13th. Every railroad company in the country, irrespective of gage or importance, had been invited by Government to depute its locomotive superintendent or other officer to represent it, while the State Railroads had been ordered to send their locomotive superintendents. Besides these officers, the Government of India ordered the attendance of their director of railroad construction and their consulting engineers for railroads. This attendance was designed to enable a thorough discussion to be had regarding the Government standard maximum and minimum dimensions and weights which at present govern and limit the design of locomotive engines, and which had been alleged to hamper unduly the most efficient designs. There were represented 2,870 engines of 5 ft. 6 in. gage; 1,393 of 3 ft. 3⅜ in.; 332 engines of combined 5 ft. 6 in. and 3 ft. 3⅜ in. gages; and 18 engines of 2 ft. and 2 ft. 6 in. gages, making the total 4,613 engines. There were, however, other narrow-gage engines represented and not especially mentioned, and there are some lines that were not represented.

The Government consulting engineers who attended were: Mr. C. W. Hodson, Director of Railroad Construction, Supreme Government; Colonel W. H. White, R. E., Calcutta, Bengal Presidency; Mr. F. B. Hebbert, Lucknow, Oudh, Punjáb, and Sindh; Mr. E. W. Arundel, Shillong, Assam; Mr. R. W. Egerton, Madras, Madras Presidency; Mr. G. A. Anderson, Bombay, Bombay Presidency; Mr. G. V. Martyn, Rangoon, Burma.

Subject I.—How far advisable it was to relax the Government standard dimensions which govern and limit the design of locomotive engines.

On this the conference unanimously resolved that the maximum weights permissible for locomotive engines should be increased as far as possible where the roads are strong enough for heavier engines than now employed. There was a general feeling among the majority of the representative locomotive men present that axle load was not at all a really vital point, as by suitable designs embodying sufficient axles in the wheel base it was possible to build very heavy engines, which would strain existing structures little or no more than the existing lighter engines now in use. Some members of the Conference, infected with the present fashionable "big-engine craze," wanted not merely big engines, but engines with the fewest possible wheels and axles; but it is very unlikely that they will attain their goal for some years to come, as the Consulting Engineers' Section of the Conference very decidedly expressed its opinion that it could not recommend to Government any very great relaxation in the existing standard dimensions and rules.

Subject II.—How far it was possible to reduce the number of standard classes of engines required for each gage, and to introduce standard parts and details for different engines on the same gage.

This led to a very protracted and lively discussion, which eventually ended in deciding as follows: For the 5 ft. 6 in. gage seven main types of engines to be designed in two series to suit two standard axle loads of 15 and 17 tons each, namely:

1. Fast passenger engines with tenders, 4-wheel coupled, 6 ft. 2 in. dia., bogie.

2. Fast passenger engines with tenders, 4-wheel coupled,

6 ft. 9 in. dia., bogie, and trailing axle ("Atlantic" type).

3. Fast passenger engines with tenders, 6-wheel coupled, 6 ft. 2 in. dia., bogie.

4. Goods engines, 8-wheel coupled, 4 ft. 6 in. dia., with tender.

5. Goods engines, 6-wheel coupled, 5 ft. 1½ in. dia., with tender.

6. Goods engines, 6-wheel coupled, tank, otherwise like No. 5.

7. Goods engines, 6-wheel coupled, same as No. 5, but wheels 4 ft. 6 in. dia.

For the foregoing engines three sizes of tenders were fixed, to carry 2,500, 3,000 and 4,000 gals. of water, with 6, 7 and 8 tons of fuel, respectively. Boiler pressure in all engines to be 180 lbs. Sizes of cylinders to be fixed later.

For the 3 ft. 3⅜ in. gage it was decided to ask for five standard tender engines for heavy roads and five for light roads. The heavy road engines to be designed for 9 or 10-tons axle load, as may be subsequently sanctioned by Government, the light road engines for 8 tons axle load, the present standard maximum. Tank engines to be left unstandardized, beyond stipulating that their parts and details should conform as far as possible to those of standard tender engines. The list is as follows:

For Heavy Roads.

1. Fast passenger engines, 6-wheel coupled, 5 ft. dia., bogie.

2. Cylinders, 15 in. or 16 in. x 22 in., 4-wheel coupled, 4 ft. 5 in. dia., bogie.

3. Mixed traffic engine, same as No. 1, but wheels 4 ft. 5 in. dia., cylinders as above.

4. Goods engines, same as No. 3, but wheels 3 ft. 6½ in. dia.

5. Cylinders as above, same as No. 4, but radial axle instead of bogie ("Mogul" type).

For Light Roads.

6. Fast passenger engine, cylinders 15 in. or 15½ in. x 20 in., 6-wheel coupled, 4 ft. 5 in. dia., with leading and trailing radial axles ("Prairie" type).

7. Mixed traffic engine, cylinders 14½ in. x 20 in., 6-wheel coupled, 4 ft. 5 in. dia., bogie.

8. Mixed traffic engine, cylinders 15 in. or 15½ in. x 20 in., 8-wheel coupled, 3 ft. 6½ in. dia., with leading radial axle ("Consolidation" type).

9. Mixed traffic engine, cylinders 14 in. x 20 in., 6-wheel coupled, 3 ft. 6½ in. dia., with leading radial axle ("Mogul" type).

10. Mixed traffic engine, cylinders 14 in. x 20 in., 6-wheel coupled, 3 ft. 6½ in. dia. (present State Railroads F class).

It was further unanimously resolved that long experience on the 3 ft. 3⅜ in. gage proved that engines with outside frames were much preferable to those with inside frames, as outside frames not merely permit of a firebox some 3 in. wider, but render the inspection and oiling of the engine much easier. It was further resolved for the same reason that outside valve gear was advisable.

It was further unanimously resolved that the British makers having offered through the Secretary of State for India to prepare in collaboration designs for standard engines, they should be asked to submit the same on the lines above indicated for consideration by the locomotive superintendents at a future conference, the same to be submitted through the London consulting engineers of the various railroad companies and administrators, for their opinions in the matter.

Subject III.—(1) How to prevent departure without due authority from such standards as may be eventually decided on; and (2) how to ensure that future improvements should be introduced into the standard designs from time to time as dictated by further experience.

These two questions raised the biggest debate of the Conference, in which, at first, a great deal of division of opinion was exhibited. Eventually a very large majority of the members carried the following resolutions, proposed by Mr. C. E. Cardew, of the Burma Railways:

(1) That in order to maintain the standards which may eventually be arrived at, it is desirable that the existing Committee of Locomotive and Carriage Superintendents for India be recognized by Government and the various railroad companies as the tribunal for maintaining or relaxing those standards from time to time, and that the Committee and its chairman be invested with the necessary powers for performing such functions. Minor alterations which are not of such an extent or character as to constitute substantial departures from the accepted standard designs may be arranged for by individual railroads direct with the makers.

(2) That the same Committee shall, at such times and in such manner as may be hereafter arranged, take into consideration all important alterations which may be from time to time suggested for general adoption by individual superintendents, or by consulting engineers, or by the makers of locomotive engines, and after consultation with the various consulting engineers in London, and the principal makers, take steps for their authoritative introduction in all future orders for locomotive engines.

Subject IV.—To report what may be the immediate future requirements of locomotive engines for enabling the Secretary of State to place orders in advance as far as possible.

The Conference dismissed this subject very shortly and promptly by resolving that this being purely a matter of finance affecting railroad administrations having new lines under construction, or contemplating large renewals of engine stock, it was not one that could be properly or usefully discussed or dealt with by it.

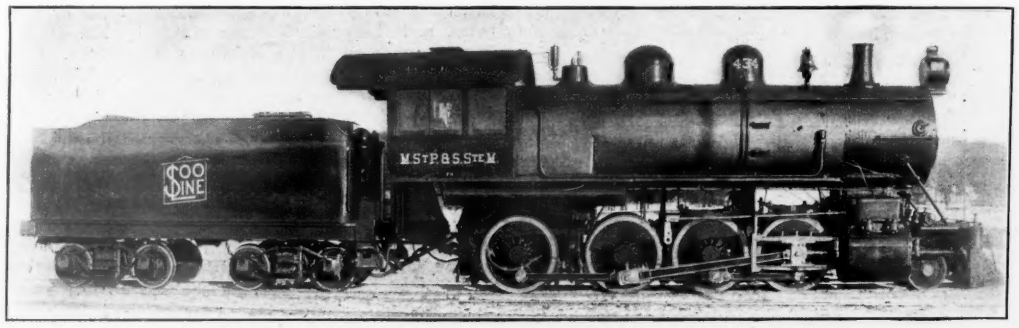
Subject V.—How far it may be advisable to relax the present specifications and methods of inspection.

This led to a very interesting discussion, in which several members who have themselves been inspectors for various consulting engineers in former years, or have seen how such work is actually conducted, expressed very strong opinions that the locomotive builders have been making the most of a fancied or very exaggerated grievance, probably animated with the hope of shaking off all inspection worthy of the name. Eventually the Conference arrived at the following unanimous resolution:

That the present specifications and methods of inspection are the work of the consulting engineers in London, and it seems to the Conference that the matters referred to in this clause may well be left to the consulting engineers to settle. The Conference is of opinion that the present specifications are excellent, and that the results of the specifications and the system of inspection are most satisfactory. The Conference does not consider it is advisable to relax the specifications or methods of inspection. It is evident that to a certain extent the reasonable application of any system of inspection must always be a question for the individual intelligence of the inspectors, and the solution of any difficulty in this respect is to appoint inspectors who are practical locomotive engineers. If this be done, why inspection should entail any serious delay is not apparent.

Schenectady Two-Cylinder Compound Locomotive—Soo Line.

The accompanying illustration shows one of four two-cylinder compound consolidation locomotives recently delivered to the Minneapolis, St. Paul & Sault Ste. Marie Railway from the Schenectady Works of the American Locomotive Company. These locomotives are known as class F-8 in the railroad classification. Mr. F. A. Foque, Mechanical Superintendent, has sent the following general information.



Schenectady Two-Cylinder Compound Locomotive—Soo Line.

The cylinders are 22½ and 35 in. x 30 in., and the driving wheels are 55 in. in diam. over tires. The total wheel base is 24 ft. 7 in., and the driving wheel base is 16 ft. 6 in. The weight in working order is 177,000 lbs., 152,000 lbs. of which is on the drivers. The outside diameter of the boiler at the first ring is 70½ in. and the center line of boiler above rail is 9 ft. 2 in. The firebox is 102 in. long, 65 in. wide, and 75½ in. deep at the front end, and has 159 sq. ft. of the total of 2,633 sq. ft. of heating surface. The grate surface is 46 sq. ft., and there are 326 tubes, 2 in. in diam., 14 ft. 6 in. long. The working steam pressure is 210 lbs. per sq. in.

The frames are of hammered iron, and the piston rods, stay-bolts and crank pins are Taylor iron, the latter being case-hardened. The axles, which are also of Taylor iron, have main journals 9½ in. in diam. x 10 in. long, and the other journals are 8½ in. in diam. x 10 in. long. The driving boxes are steel.

Among the special equipment are Michigan lubricators, Metropolitan and Ohio injectors, K. & M. Magnesia boiler lagging, Washburn coupler with Westinghouse friction draft gear, Common Sense truck bolsters, McCord oil boxes, Westinghouse American brakes and Westinghouse 9½-in. air pump, Crosby pop valves, Leach sanding apparatus, and Sterlingworth brake-beams.

Braking Fifty-Ton Cars, Light and Loaded.

From the January Proceedings of the Pacific Coast Railway Club, the following question, the answer by Mr. H. H. Forney, General Air-Brake Inspector of the Southern Pacific Co., and some of the discussion are extracted:

"What is to be the solution of the problem of properly equipping the 100,000-lb. capacity car so that its braking power may be normal, light and loaded?"

First. These cars must have sufficient braking power to be handled safely in any kind of service.

Second. They must have sufficient braking power to be handled safely on the ruling grades of the road.

Third. The arrangement or adjustment of the braking power must be simple, strong, and conform in a general way to the standard apparatus now in use.

Fourth. The arrangement must not be a radical departure from standard practice, so as to require either a different arrangement of train or additional engine equipment.

Under the first, it will be necessary, owing to the great difference between light and loaded car, to have some form of brake equipment which will admit of having more braking power on a loaded car than on an empty one, and the braking percentage on a loaded car must be high enough to insure it holding, instead of a portion of the weight being thrown upon the other cars in the train; the braking percentage for total load should be equal to the brake percentage of a safe train.

Second. As the maximum grades on most roads will average about 2 per cent., it is necessary, for safe handling of trains on such grades, to have a train-braking percentage of about 30 per cent. of total load.

This may be accepted as the minimum braking power allowable on cars to insure a margin of safety in ordinary service; but as the maximum braking percentage obtainable under the present system is limited to 90 per cent. of the light weight, it is obvious that, with the present light weight of large-capacity cars, the minimum limit cannot be obtained, and it is a well known fact that at present the large-capacity cars are being operated with a braking percentage of from 17 per cent. to 21 per cent. of total load, depending upon other cars in train with excess braking power to hold them, which is an unwise and dangerous proceeding.

Upon comparison of the light weights and capacities of cars, it will readily be seen why a train composed of the lighter-capacity cars is easy to handle, for the light weight approximates one-third of the total load; so, with a maximum braking percentage of 90 per cent. of light weight, the minimum limit for total load is not exceeded, while with the large-capacity cars the light weight varies from one-fifth to one-fourth of total load, and the braking percentage varies in like proportion; so, to fulfil the requirements, it will be necessary to have a variable braking power.

Third. In applying a variable or adjustable braking power, it would naturally follow that a complicated or entirely new apparatus would not be desirable, owing to the reasons that it will fall into so many different hands, and the liability to get out of order. Also it must be strong, and if it conforms in a general way to the present standard apparatus, there will be less trouble in educating employees to handle it correctly. It is perhaps unnecessary to mention that any apparatus which would not be perfectly interchangeable and work in harmony with the present system, or would require either a special arrangement of train, or a specially-arranged engine, would not be practical, and could not be considered.

From the above conditions, it would seem as if the solution for the immediate future would be that a foundation rigging should be designed strong enough to withstand twice the strain as at present; then equip the car with two brake-cylinders of the present size, connecting to the same system of levers, which is arranged so that, when the car is empty, one cylinder will be in use, and the car will brake at 75 per cent. of its light weight, and, when loaded, "cut in" both cylinders, which will raise the braking percentage to 150 per cent. of light weight, or about 35 per cent. of total load.

With such an arrangement the desired result could be obtained by the use of standard apparatus; the liability of slid-flat wheels would not be as great as at present, and the education of all concerned would be reduced to simply cutting in or cutting out one brake-cylinder. While this arrangement necessitates the application of two triple valves, brake cylinders, etc., to such cars, and will require a large pump and storage capacity on the engines, it has distinct advantages over any form of adjustable rigging which has yet been designed, for all such riggings have a great many loose joints to wear and get out of line; also, whenever the adjustment is changed, the piston travel varies to such an extent that it must be adjusted, requiring more time and expense for maintenance.

Mr. Englebright.—I have given considerable thought as to a remedy for the subject in hand, but in trying to arrive at a solution of the difficulty, I have always run up against the question of cost. I am astonished that a man of Mr. Forney's experience would advocate a thing like that. I do not think railroad management would consent to such a radical change. The first thing they would want to know would be, What does it cost? And I am afraid that the correct answer to that question would close the subject at once.

Mr. Forney.—It might, still, when we look back over railroading during the past, we remember when an engine that weighed 30 tons was considered a large machine; then came the 60-ton engine; then came the 80-ton engine; then the 100 and 120-ton engine; but when they increased from one engine to another did the management consider the cost? Only a short time ago it was

my fortune, or misfortune, to take a train of 28 cars down the Tehachapi Mountains. I attempted to handle that train with one engine. We had 105 lbs. of air when we started, and it was necessary for me to call for hand-brakes before I had gone a mile from the top of the hill; and, with the combined efforts of the hand-brakes and air, we ran half a mile through Mojave yard before we stopped. Now, what can you suggest of more advantage than to have duplicate apparatus on these cars? Is there any trial which could show up the advantage of doubling the braking power any more than would the double braking power of a train of that kind?

The Latest Hauss Mail Crane.

In our issue of Aug. 7, 1896, we illustrated the Hauss iron mail crane, many of which are now in use, and the accompanying engravings show how this crane has recently been modified and improved. The new crane is designed to deliver mail pouches to and receive them from trains, and to do this without damage to the pouches or their contents. The photographs shown were taken on the Louisville Division of the Pittsburgh, Cincinnati, Chicago & St. Louis, where the crane has been tested in service. In these tests perfect exchanges were made

Fig. 1.—Hauss Mail Crane.

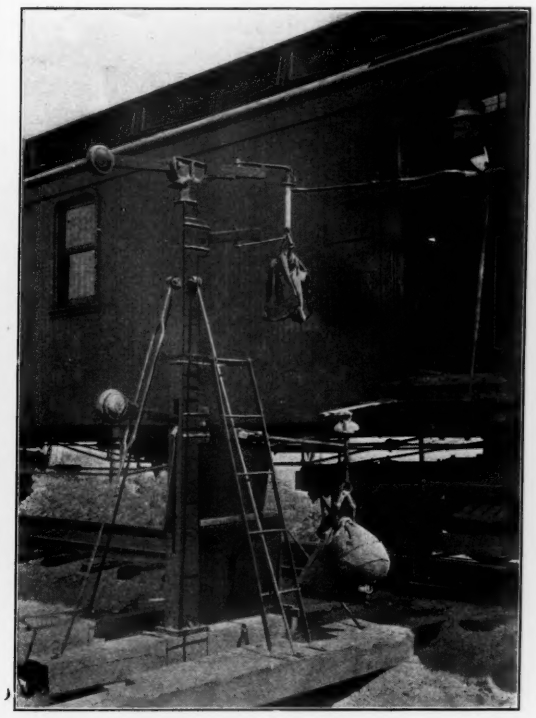


Fig. 2.—Ready to Deliver and Receive.

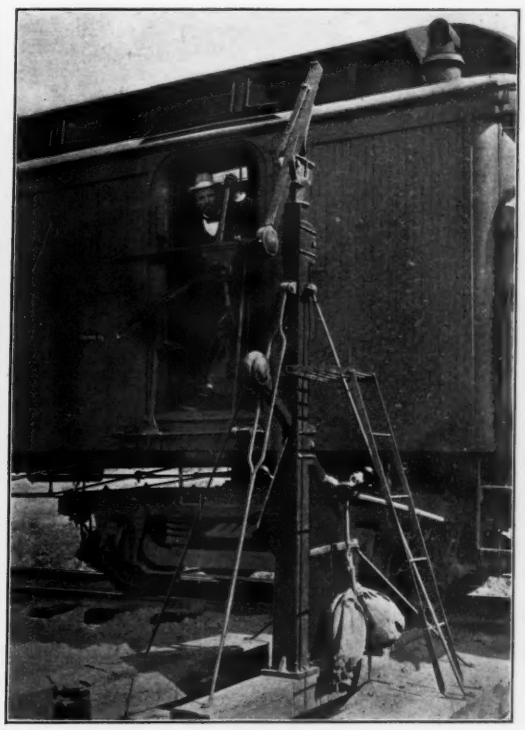


Fig. 3.—After Receiving and Delivering.

when the trains were running at speeds varying from 40 to 80 miles an hour.

As shown, the post is of cast-iron; and the delivering and receiving arms are malleable iron. The ladder, guy rods and fingers are wrought iron. As in the earlier cranes, the upper arm has a plate spring resting on top of the column, and this spring permits a downward motion of the arm in delivering, easing the strain on the rings and tending to free the rings more easily.

The pouch is not hung in the usual way. Instead of hanging it up by rings attached to the opposite ends, a strong cord is wrapped around the middle of the pouch and both ends of this cord are snapped on to the lower ring of a flexible cable carrier. The upper ring of this carrier engages the upper finger of the crane and the lower ring engages the lower crane finger. Figs. 2 and 3 show how the messenger's catcher takes the pouch by engaging this flexible carrier instead of the pouch. As soon as the pouch is taken off the crane the upper delivering arm rises and the lower delivering arm falls, so as to be clear of trains.

The same views show how delivery is made from the car to the crane. The crane has a special receiving arm, about level with the car floor, provided with a sheet iron stop which receives the blow from the pouch as it is delivered from the car. As the cable with the suspended pouch enters the crane receiver, the receiving arm drops to an angle of 45 deg. which places the receiving arm out of the way of trains when the crane is not in use. It will also be seen from the engravings that the usual movements of the messenger answer the two purposes of delivering a pouch to the crane and receiving a pouch from the crane.

The objects of this design are to enable exchanges to be made without damage to the mail pouches and overcome the troubles brought about by throwing mail sacks from fast moving trains. In addition to the liability of striking people at stations, it frequently happens that pouches are drawn under the car wheels.

Dr. A. P. Hauss, who has worked out this design, has been surgeon of the Pennsylvania Lines for the past 12 years, and these cranes will be made by the Hauss Iron Mail Crane Co., New Albany, Ind. The device is now before the Postoffice Department with a view to getting an official test.

Notes on the Wear of Journals.*

These notes are the outcome of an investigation of the consumption of axles on the C. G. W. Ry. Owing to the difficulty of keeping accurate records of journal wear, the figures cannot be taken as absolutely correct, but it is hoped they will be of some interest to the club.

Tender Axles.—The average life of tender axles for ½-in. wear in diameter of journal appears to have been about 14 years, or, say, 490,000 miles. Only 5 per cent. of these axles have been removed on account of worn collars. Tender axles seem to be the most economical of all the axles, in that the journal wears slowly and the number removed for collar-wear is small. This is no doubt due to the excellent care they receive and the light average load they carry.

Engine Truck Axles.—The records, though very incomplete, indicate the average life of engine truck axles for ½-in. wear in diameter, to have been about seven years, or, say 245,000 miles. This low mileage may be accounted for from the fact that they have been run with babbitt bearings, have smaller wheels, hence a higher velocity, and have a considerable tendency to wear tapering, requiring frequent truing up. Engine truck axles have made only half the mileage for the same depth of wear as tender and driving axles.

Driving Axles.—The record of a number of driving axles shows an average of 476,800 miles, or about 13 years for ½-in. wear in diameter of journal. Driving axle journals have a tendency to wear tapering and hollow, and this uneven wear is no doubt due to an uneven distribution of dirt in the packing. This unevenly distributed dirt wears both journal and bearing unevenly, concentrates the load on a small area, and when the load becomes so concentrated that the unit of pressure is sufficient to exclude the oil, a hot-box results. However good the bearing metal and packing may be, there is no assurance that a box will not run hot so long as dirt can work in at the sides of the box and produce this concentration of load at the center. A driving box which will distribute the dirt uniformly along the journal, or, better, exclude it altogether, is much to be desired.

Freight Car Axles.—An average of a number of 4¼-in. x 8-in. axles shows a life of 3.83 years per $^1/_{32}$-in. depth of wear, or about 30 years for ½-in. in diam., which is the life of the axle. Only 29 per cent. have been removed on account of worn collars, so that a large majority run the full life of their journals, unless the wheel seats are reduced to the limit before the journals are worn out. This indicates the importance of never reducing wheel seats, except when in such condition that wheels cannot be fitted to them. Assuming that a freight car makes 25 miles per day, the life of a freight axle will be about 274,000 miles, which is not much more than half the mileage made by a passenger car axle. The probable explanation is that freight boxes receive less care as to tight lids and dust guards and clean packing, and contain more dirt to wear away the journal.

Passenger Car Axles.—The average of a number of 4¼-in. x 8-in. passenger axles indicates a life of seven years, which, at 72,000 miles per year, gives a mileage of 504,000 when the journal is worn ½ in. in diam. This is approximately the mileage made by driving axles for the same depth of wear, and is twice that of freight car axles. For several years past 24 per cent. of all passenger car axles in service have been removed annually, and of those removed 94 per cent. are on account of collars worn off. Of the axles removed with collars worn off, 70 per cent. are mounted with steel-tired wheels, 30 per cent. with cast-iron wheels. The tendency of steel wheels to wear out their flanges is no doubt the cause of their wearing the collars off their axles so rapidly, and this tendency is what makes steel wheels so much more expensive than cast-iron wheels. The rapid wear of passenger axle collars suggests the possible economy of using collarless axles under passenger cars.

In answer to my letter of inquiry as to why the Pullman Company uses the collarless journal, Mr. H. M. Pflager, Mechanical Superintendent, writes that they find the collarless journal lasts longer than the collar journal, on which the collars wear thin, making it necessary to scrap the journals before they are worn down to the limit. They also find that the cost of maintaining trucks with the collarless journals is less than with the collar journal, and they have noticed that the wheel wear is in favor of the collarless journal. They are of the opinion that they have a smaller number of hot boxes with the collarless journals.

In conclusion, it seems to me that the quality of bearing metal and packing need not be a source of much anxiety, but that an increase in the life of journals and a decrease in the number of hot boxes depend mainly on the exclusion of dirt.

President Foque.—Mr. Van Alstine, I would like to inquire in regard to your limit of wear on driving axles. What is your practice in removing them?

Mr. Van Alstine.—Our practice has been ½ in. in diam., which is arbitrary. A half-inch on some classes of engines leaves them at about the safe limit; a half-inch on others brings them below it. But it has been customary, and we have never changed it.

Mr. George Dickson (Great Northern Ry.).—I would like to ask Mr. Van Alstine if driving axle journals are not often reduced by being turned up when they are out of round, thereby losing the mileage of the metal removed. Suppose an engine is out of balance, and the journal wears on one side, every time it comes into the shop it is turned off to bring the engine into quarter again, would we call that wear of the journal?

Mr. Van Alstine.—Those figures cover the wear of the journals just as they come to the shop. They have run the number of miles stated per half-inch reduction in diameter of the journal.

Mr. R. P. Blake (Northern Pacific Ry.).—I would like to ask if anybody has had any experience with the "Universal" bearings which shows whether it makes any difference in the wear of axles. I believe one of the points they claim in favor of them is that the wear of the inside and outside of the journal is made the same; the bearing can adjust itself so that it will wear uniformly and not taper the journal, and I would like to know if anybody has had any experience which would indicate whether that claim is true or not.

Mr. Van Alstine.—I never have had much faith in them as compared with the ordinary M. C. B. bearing, and I believe that the M. C. B. bearing is fully as adjustable endwise of the journal, because the wedge is curved on top, if it is properly made, but I do not believe that any amount of adjustment of that kind has very great effect on keeping true journals. The principal cause, in my opinion, of journal wear, is dirt, and the dirt gets into a considerable extent through the lid, and to a greater extent, with most cars, through the dust guard, and the grinding between the journal and the

*By David Van Alstine, Superintendent of Motive Power, Chicago Great Western Railway. Reprinted from the January issue of the *Proceedings* of the North-West Railway Club.

bearing is what produces the wear. I venture to say that most car men will bear me out in the statement that 99 per cent. of the hot bearings begin somewhere near the center of the bearing—rarely at the ends. The reason is, I think, that the dirt grinds away the bearing at the ends, and concentrates it at the center, to a point where the load is so concentrated that the oil cannot stay in and the journal becomes dry. So that, as I remarked in the paper, a box either ought to exclude the dirt entirely, or it ought to distribute it uniformly. Either way would reduce the number of hot boxes.

Prof. Flather.—There was an inquiry a few meetings ago here in the topical questions, as to what had been done with roller bearings for car service. I hardly think that the conditions of railroad service would be suitable to the application of roller bearings for railroad journals, although roller bearings are in use on the Pennsylvania System in their push cars for coaling locomotive tenders. These have a capacity of about two and a half tons, and are easily operated by one man.

For machine bearings and bearings that do not have the same service that we expect cars and locomotives to have, there is nothing like a good roller bearing. The reduction in power is very marked. We have been conducting some experiments at the University for the last two or three years on just such problems, with varying speeds and varying loads and pressures, etc., noting the temperatures and speeds. Those tests have covered plain cast-iron bearings, babbitted cast-iron bearings, bronze sleeves, and roller bearings. The experiments have been conducted usually on a 2-in. standard shaft, although some have been made on bearings 4 or 5 in. in diam. In all cases the temperature, pressure and speed were observed, and given runs made for definite intervals of time. In some cases the bearings were run under a given pressure until a definite rise of temperature was observed, which, with the cast-iron bearings, was in the neighborhood of half an hour. With the babbitted bearings this same rise was obtained in two or three hours, but in the roller bearings continuous runs were made for periods of over 20 hours, and even then the number of degrees increase was not attained. With higher pressures and speeds the babbitted bearings were melted out and the cast-iron bearings seized, but with the roller bearings the journal seemed in even better condition after the tests than before, and the bearings themselves appeared in no wise injured. The question of power was quite marked, and, in general, we may say that the power required to operate with the roller bearings under normal conditions was possibly one-third as great as that with the babbitted bearings. For places where roller bearings could be used, as, for instance, in certain machines and shafting, they certainly offer an excellent device for saving power. I understand that they have been used to some extent in street railroad service with very good results, but I hardly think that they can be used in railroad service under present conditions of rolling stock and track.

Mr. Van Alstine.—We remove 24 per cent. of all our wheels in passenger service each year on account of axles. There are something less than half of them steel wheels.

President Foque.—We ourselves run steel wheels almost exclusively, but while I have no figures at hand to show it, I am under the impression that the greater majority of those wheels are removed on account of either worn tread or flange. The defects are wear of the tire itself, rather than wear of the journal. I have never noticed any unusual wear on the collar.

Mr. Dickson.—I think Mr. Van Alstine is right about that. Wheels, and especially steel-tired wheels, are generally removed on account of worn tread or cut flanges. I believe that a pair of wheels having a cut flange will cause more wear on the axle collars. The reason for this is that the increased lateral motion on the rail adds to its momentum, sending it against the collars with greater force, resulting in greater wear.

I remember some time ago that we removed quite a number of axles from our passenger service on account of thin collars, not that the wheels were removed from under the car on this account, but when once removed we found that the collars were too thin to be placed in that service again. To overcome this we found it necessary to increase the size of our fillets, which resulted in giving us much better service. Speaking of the collarless journal, I do not think that it will wear its fillet as fast as the collar journal. There may be a little more expense keeping the collarless journal in good shape, the stops must be kept up, so that the lateral motion will not be too great, then the life of the journal should be longer on account of the increase in the length of its bearing. We are using the collarless journal in our new passenger equipment, and experienced a little trouble at first, but after our men got on to the way of looking after them they have given us no more trouble and are now giving good service.

President Foque.—We would like to hear your ideas, Mr. Lovell, in regard to driving axles, the proper limits of wear.

Mr. Lovell.—We have a stated size for each class of engine, which is the limit. When they get worn down to that limit, they are to be removed. The total reduction of journals is only about ¼ in. for the last turning. Another ⅛-in. of wear is allowed after the last turning. But the limit is arrived at by the safe load that we consider is proper for the diameter of the journal. When it gets down to that limit we remove it.

National Convention of Railroad Commissioners.

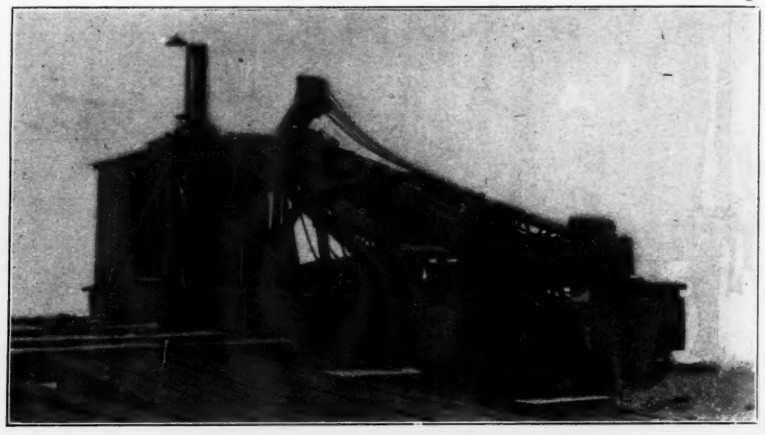
The fourteenth annual convention of State Railroad Commissioners was held at Charleston, S. C., Feb. 11 and 12. The States represented were: Alabama, Georgia, Illinois, Iowa, Kansas, Maine, Massachusetts, Minnesota, Missouri, North Carolina, Pennsylvania, South Carolina, Texas, Virginia. The Association of American Railway Accounting Officers, and the Street Railway Accounting Officers' Association of America were represented. The Interstate Commerce Commission was represented by Edward A. Moseley, Secretary, and Martin S. Decker, Assistant Secretary. Mr. C. J. Lindley, of Illinois, presided.

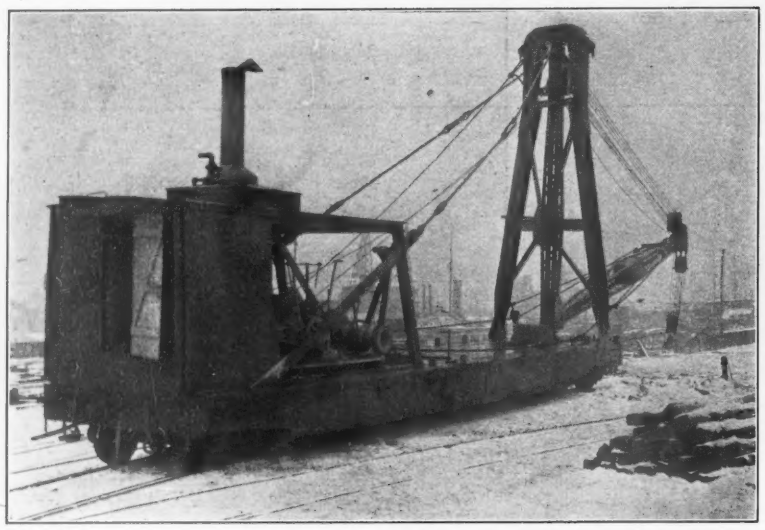
The committee on highway grade crossings failed to make a report, but the subject was discussed, nevertheless, and there was considerable sentiment in favor of trying to restrict the establishment of new wagon road crossings. The association adopted a report reaffirming former recommendations concerning legislation, including one in favor of a national freight classification, to be prescribed by the Interstate Commerce Commission. Somebody proposed a scheme for having state railroad commissions compile lists of persons who want employment on railroads, with lists of discharged railroad employees, etc., but Mr. Moseley read a protest from the Brotherhood of Locomotive Engineers, and the scheme was promptly rejected. Mr. Hennessey, of Missouri, brought a report, recommending legislation prohibiting the use of car couplers which will not couple on sharp curves; but after some discussion he found it expedient to withdraw the report.

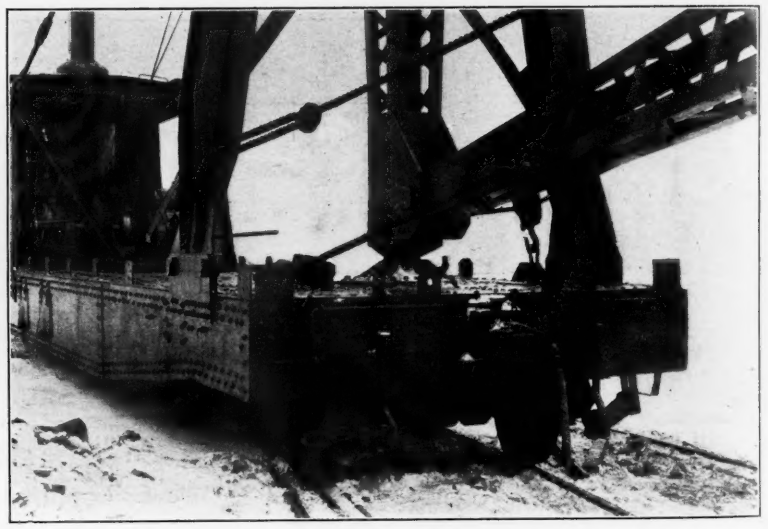
The President of the Association for the ensuing year is Mr. B. F. Chadbourne, of Maine.

A New Derrick Car.

The Structural Department of the Illinois Steel Co., Chicago, has designed and built a new derrick car for L. M. Bernhisel, Contractor, Evanston, Ill., who is now using it on railroad bridge work. The principal features of the design are shown by the accompanying engravings.







Derrick Car Built by the Structural Department of the Illinois Steel Company, Chicago.

It will be seen that the underframe and floor of the car are steel throughout. The "A"-frame and derrick are mounted at one end and the hoisting apparatus is at the other end. None of the pictures show this apparatus enclosed but movable doors were supplied for completely enclosing the engine and driving gear. In working order, the car weighs 112,000 lbs. and is 50 ft. long and 10 ft. wide. It is equipped with M. C. B. couplers, air-brakes and the usual style of draft gear, so that it can be hauled in a train the same as an ordinary car.

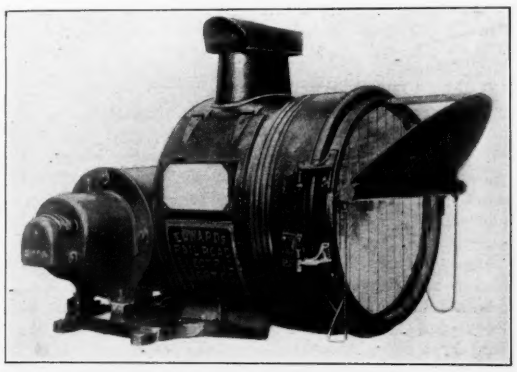
The car was designed for and was tested with a load of 30 tons suspended from the end of a 40-ft. boom. This load was swung through an arc of 24 ft., and a 20-ft. extension piece is furnished with the car and can be inserted in the middle of the boom, making the length of the boom 60 ft. Provision is made for side lines from the top of the "A"-frame to brace the car when the derrick is in use. A 30-h.p. reversible, link-motion Lidgerwood hoisting engine is used, having two drums and four independent spools, which furnishes power for operating the derrick and propelling the car. The forward shaft of the engine is fitted with a double set of gears and clutches capable of driving the car along the track at variable speeds up to 10 miles an hour.

One of the photographs shows the car with the boom loaded on it and the "A"-frame let down. In this form the car is transported long distances. We are indebted to Mr. W. H. Pratt, Manager of the Structural Department of the Illinois Steel Co. for photographs and data.

The Edwards Electric Headlight.

A new electric headlight has been put on the market by the Edwards Railroad Electric Light Co., of Chicago and Cincinnati, Ohio, embodying some new features, the most prominent of which is the projection, by a suitably placed reflector, of a shaft of light into the sky, which can be seen from a great distance, and acts as a warning signal when the train is hidden from view by curves in the track and intervening hills. Another feature is the use of a curtain for dimming the light when two trains are approaching one another, the operation of the curtain being controlled by the engineman from the cab. Both of these features appear in the illustrations shown.

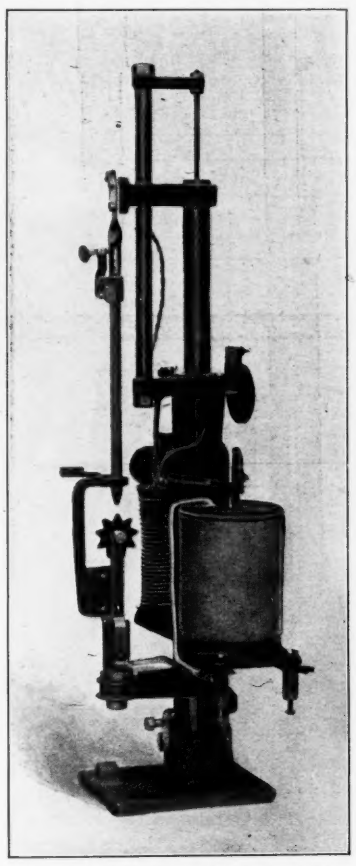
The dynamo is driven by a steam turbine having but one nozzle. Sectional views of the turbine, the



Edwards Electric Headlight with Screen Up.

valve and the nozzle are shown, from which the form and action of the governor may be seen. The turbine shaft runs on ball bearings having ring oilers. The dynamo output is 30 amp. at 30 volts, or 900 watts, and tests by the company show the lamp to be something over 6,000 candle power. On electric headlights the lower, or negative, carbon of the ordinary arc lamp is replaced by a copper rod, this being possible because of the current and voltage employed, and which enables a constant focus to be maintained. In the illustration shown of the lamp, this negative is of a peculiar form which the company is experimenting with at the present time.

In a service test run by the company for 153 nights to



Lamp—Edwards Electric Headlight.

determine the cost of operation of the electric headlight the results showed the average net cost per hour to be 2.41 cents. The corresponding figure for the oil light is given as 1.2 cents, making the increased cost of operation of the electric headlight 1.21 cents per hour.

The Chicago, Milwaukee & St. Paul has been experimenting with two of these lights for several weeks, having two of its largest passenger engines, Nos. 919 and 920, equipped with them, and the officials are watching results very carefully.

On the evening of Feb. 12 a special train, composed of a parlor car and a caboose, drawn by engine 919, and carrying a party made up principally of representatives of various papers and officials of the St. Paul, was run out to Morton Grove, 18 miles north of Chicago, observations on the power of the light and illumination of the track being made from the cabin of the caboose. While the party was at Morton Grove engine 920, with train No. 6, passed going south, its approach giving an opportunity of noting from a distance the signal-ray feature and the power of the headlight.

Shop Practice for All-Steel Cars—Boiler Design.

Under the above heading, we gave, in the *Railroad Gazette*, Jan. 24, page 53, two special committee reports received at the annual meeting of the Central Railway Club, Jan. 10. The following extracts give parts of the discussion on both subjects, and there was also some discussion about the relative merits of wire brushes, scrapers, air-driven chisels and the sand-blast for removing scale from steel cars before repainting them.

Maintenance of All-Steel Cars.

Mr. Miller.—I would like to ask if the committee is able to state as to the comparative expense in repairing iron or steel cars as compared with the repairs of wooden cars in like conditions?

Mr. Dow.—It depends a good deal on the nature of the repairs. For a side-sill, or end-sills, I think we can do it about as cheap as we can wooden cars; but to put in a center-sill will cost considerably more. Of course, the repairs are entirely different on a steel car from what they are on a wooden car. We should just as soon see a steel car as a wooden car on the track; doesn't require any more skilled labor than it does a wooden car to repair them.

President West.—Do you think the expense or annoyance or delay to a railroad's equipment that is composed entirely of steel cars would be any more serious than it would be if they were an equal number of wooden cars?

Mr. Dow.—Yes, sir; it will take longer to repair it. You cannot work as many men on them as you can on a wooden car. The delay would be longer, especially on account of the scarcity of the material now.

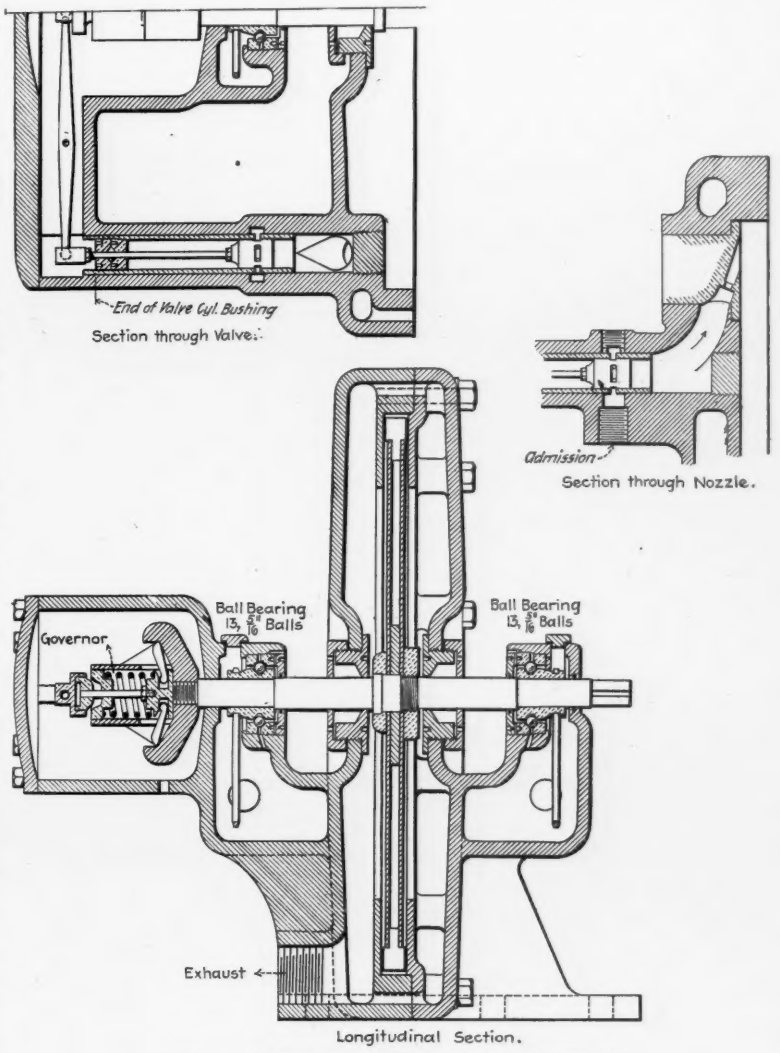
Mr. Macbeth.—It would be better for shops to arrange to procure a few suitable tools specially for the purpose of riveting. My experience has been that we find little or no trouble with the age of the steel cars, with corrosion. Of course, it is a matter that will have to be taken up in the near future, but the vital point is to impress upon all the railroads the necessity of having suitable tools to cover the repairs. At the present time repairing steel cars looks to be a large problem. For instance, they are delayed two or three weeks for a small defect that could be repaired very promptly, provided proper tools were on hand to cover the work. In my opinion Mr. Dow has clearly explained this matter, both in the report submitted and in his remarks.

Manufacturers should realize the necessity as well as the mechanical men of covering this subject. For a very small item of expense tools could be put in shape to repair any steel car traveling at the present day. In reply to the inquiry as to placing the repairs of a steel car in comparison with that of a wooden car, I do not think this question could be answered intelligently at the present time, but I feel safe in stating that the iron car can be repaired very quickly provided the question of tools is taken up without delay.

The President.—I think there is a general impression among railroad managers that a serious objection to the steel car is the effects of rust and corrosion more than the question of repairs. I think the managers of our railroads have got the confidence in the mechanical departments of the railroads that they will devise some means to meet any mechanical objection that there is to the car; I do not think there is any question about that part of it; but I do not think they have been satisfied that there has been anything yet devised to arrest rust.

Mr. Dow.—The corrosion seems to be more up around the drop doors and hopper doors; in other words, you may say the concealed part, hinges and such parts; but there is a great deal of corrosion on the side, due to bruises, owing to operators hitting them with hammers. We find that the high cars show more than the low cars do. As for the paint, we have tried several kinds and I am not prepared to say in public what I think is the best.

The President.—There is something remarkable about this question of corrosion. We stored a few cars of coal on the road with which I am connected, on one of our side-tracks, last spring, early in the spring or late in the winter, and they were loaded with coal for which at that time there was no market. Ours is an anthracite road. And when those cars were moved from the siding we found directly under the hopper doors where the water ran in from the top and went down through the coal, opposite each opening of the hopper, a crease in the rail that you could lay that pencil in. The acids had dripped down there, and opposite each hopper for a distance of eight or ten car lengths was this crease in the rail, crosswise in the rail; some of the hinges had been almost eaten off of the cars. We do not find the same effect on the inside of the few steel cars that we have, showing that it takes time to produce those results and that loading a car with fuel and transporting it in a reasonable time to its destination would not have the same effect. I speak of this because our people were opposed to the steel car when their attention had been called to this matter. They thought that if that action took place on the rail it certainly must take place on the inside of the car. But that I do not think holds true. If some paint or some preparation can be provided to arrest that corrosion before it has serious effect on the metal, it seems to me the question of the steel car is pretty nearly settled. They certainly withstand the wreck. We had a wreck on our line on the 27th day of December in which 43 of 50 cars were wrecked. There was but one steel car in the lot and that was the best car in the train.



Steam Turbine for Edwards Electric Headlight.

Mr. McCarty.—I saw a special tool for repairs of steel cars, more particularly steel trucks, recently designed by Mr. Macbeth, instead of the ordinary sledge or bar for holding-up on rivets, operated pneumatically with a design embracing oil back of the pistons.

Mr. Macbeth.—The tool is giving very good results and I think there are other companies using the same arrangement. The Atlas Refining Co. have a similar arrangement in effect. Observation will bear me out in my previous remarks that the main point is to get a few simple tools in the different shops and repair these steel parts without delay. One or two designs of pneumatic hammers and the holder-on and a few oil furnaces for heating the rivets is all that is required in this respect. We have reduced our expense on the truck work at least 80 per cent. in this respect. To cite an instance, we would receive a carload of trucks and in order to get them in shape it would be necessary to send them to the manufacturers. It would take at least three or four months before they would be returned ready for service. With the present arrangements we keep our truck work all up to date from month to month, and we have no surplus left over. We repair 75 or 80 trucks that are damaged through accident or other means, monthly, and

I think every shop throughout the country should realize the importance of this subject as to getting the proper appliances for covering their own work.

Mr. Morford.—I had a little experience with a car of coal containing 90 per cent. slack, while we made our contract with the mines to produce coal containing not over 30 per cent. I declined to accept the car and notified the parties of whom we bought the coal to come and inspect it and take it off our hands. The car lay in our yard in the fall of the year and up to about, I should say, the latter part of January, when we received word to do with the coal as we saw fit. I set men to work unloading and when they got down to within about 6 in. of the pockets the two men went through the pockets down on the ties. The iron was entirely eaten out, I took it, by the acids and sulphur. I believe that if steel or iron cars were painted with red lead before the outside coat is put on it would be very beneficial. I think that the builders of steel cars now have got on to the fact that certain paints must be used, and if they are used I believe the steel car is a pretty good institution.

Improvement in Boiler Design.

Mr. Hogan (New York Central).—Our wide fire-boxes are giving entire satisfaction. We have the first weak point yet to discover. They are good steamers and lighter on coal in proportion than the narrow fire-box. Our firemen like them.

Mr. Morford (Michigan Central).—Mr. President, I can corroborate what Mr. Hogan says in this matter. We have some of these engines built at Schenectady, the same pattern that Mr. Hogan's engines are, and we have no difficulty whatever with steam. With our 10-wheel passenger engines, I have to give an order to hand-pick the coal to have them steam well; what I mean by hand-pick is to give them the choicest coal. I have abandoned that altogether on the Atlantic type and we shovel the coal into their tenders just as it comes from the mines, run-of-mine coal. We have no difficulty in getting steam. These engines carry 200 pounds of steam right along. To demonstrate it, we have one of this class of engines on our American Express out of Buffalo; that engine is taking 10 cars to St. Thomas, 118 miles, in 115 minutes; from St. Thomas to Windsor, 111 miles, in 102 and 103 minutes. So you can see there is no lack of steam. As Mr. Hogan says, they are a fuel saver.

President West.—The road with which I am connected has had about 40 of the wide fire-box engines—they are considerably wider than the engines referred to by Mr. Hogan—for 11 years. We have 86 now, and we are just beginning to put in the first fire-boxes; engines that came on the line at the same time, with the narrow fire-box, have all had one new fire-box and some of them two; showing that the construction is in favor of the wide fire-box. The thing that gave out with us first was around the furnace door. We have but one furnace door, but it is a very wide one. The fire-boxes were all 8 ft. 6 in. wide. We anticipated the most trouble with the stay-bolts. I am sure that we have as complete a record of broken stay bolts as any one road in the world; we test them every 30 days and we have found that the boilers have not developed any particular point of weakness. It is true that the breakage of stay-bolts has gradually worked up but that is due, as we all know, from the lower down the stay-bolts the shorter they have been and the shorter the stay-bolt is the one that first begins to break. But I think the wide fire-box is here to stay and it has a great many favorable points, and it has been my experience, as that of the two previous speakers, that it has not developed any serious objection. We are able to burn a cheaper grade of fuel or a fuel that is not uniform. I think that all the railroads are suffering more from a lack of uniformity in the grade of fuel. We get fuel one day that almost any engine would steam in and the next day the best steamers with the old narrow fire-box would lie down. But with these wide fire-boxes we are pretty sure to get good steaming engines, and that is what makes success on a railroad.

Mr. Foster (L. S. & M. S.).—Our experience with the wide fire-boxes has been entirely satisfactory and they have not developed any particular weaknesses. We have two wide fire-box engines that have been in service for a year. I do not think that there has been a stay-bolt renewed in one of them. We have not had any trouble from mud-ring leakage. We used to have a good deal of trouble with mud-ring leaks, especially in the corners. These engines have not shown the same tendency to leak as the narrow fire-boxes did. They did not steam quite as satisfactorily to start with as they might have done because we didn't know how to fire them. We found it necessary to put extra skilful firemen on them and keep them there in order to educate the rest of the firemen, but after that there was an immediate increase in the efficiency of our passenger engines. They made far more steam, did it with a very much larger nozzle and consequently with less coal and a better working engine. Now, as to the matter of furnace door, we have the single door. Our fire-boxes are 7 ft. sq.; the door is wide, of course. We have a large opening and a large door-frame that shuts over that, onto which a smaller door shuts, and we use that. I cannot say that we ever saw any necessity for having two doors. In fact, I should rather be inclined to think that the labor of firing a wide fire-box engine would be less with one door. There is a little different motion required in order to get the coal into the back corners, but when once a man has learned that, it becomes a matter of second nature and they go right along. Our engines are a 6-wheel connected engine. The Central engines are a 4-wheel connected engine. Consequently, with our short fire-box we have to have longer flues than they. We have not been able to run our flues quite as long as we did the shorter flues. The engines developed also quite an inclination to start leaking on cinder-pits while the fires were being cleaned. We were able to control that pretty satisfactorily, though, by restricting the use of the blower and by a little better grate opening which we got by changing the grates so that the fire could be cleaned in a little shorter time. We have two sets of grates operated in four independent sections.

Mr. Hogan.—Mr. Foster, of the Lake Shore, has touched upon an important question which your committee referred to, and that is the recent introduction of the long flue. The flues in the trailers on the New York Central are 16 ft. long, while those in the Lake Shore are 19 ft. Of course, 3 ft. is quite a difference. And, judging from what Mr. Foster says, there is little more trouble with the longer flue. The 16-ft. flue is giving satisfaction, but it might not do as well in proportion were we to extend it to 19 ft., while we learn from reports from foreign countries that they use a flue even longer than 19 ft. successfully.

The President.—There have two or three points been brought out in the remarks of Mr. Foster and the gentleman to my right and Mr. Foster has explained one cause which is the prime cause of most of our flue trouble; not so much the length as the ash-pit. I believe the majority of our flues are started leaking on the ash-pit.

The discussion of both of the committee reports is to be continued at the next meeting.

An Electric Blue-Printing Apparatus.

The apparatus shown by the accompanying engravings is being put on the market by the Elliott Electric Blue Print Co., of Pittsburgh, Pa. In general it consists of a glass cylinder in a metal frame work, mounted vertically on metal supports in such a way that it may be revolved to a horizontal position, as shown in Fig. 1, and an arc light suspended above the cylinder (Fig. 2) with suitable mechanism for raising and lowering the lamp.

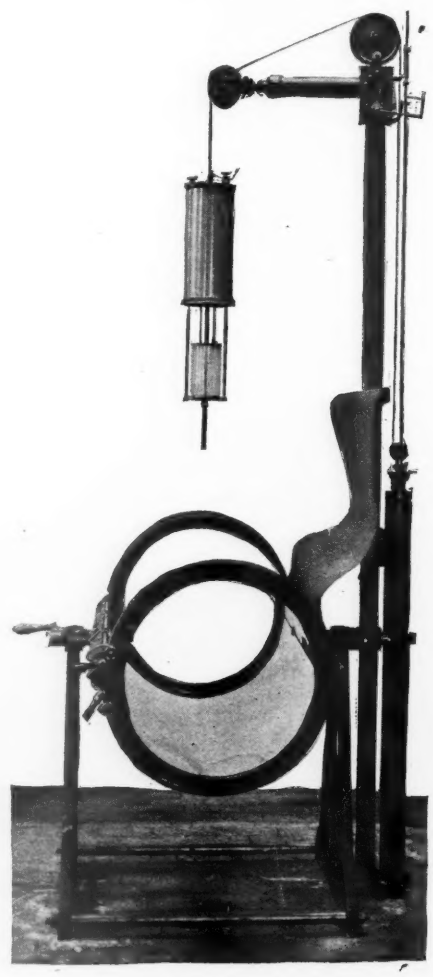


Fig. 1.

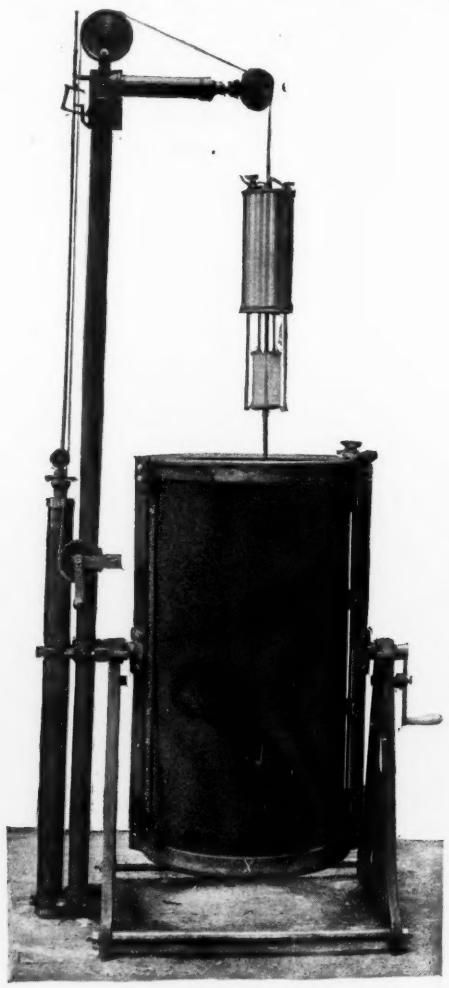


Fig. 2.

Portable Electric Blue-Printing Apparatus.

The cylinder is arranged so that two prints may be made at one time. After revolving it to a horizontal position, it is locked, the tracing and sensitized paper are inserted and the whole covered by a canvas mat, which may be drawn taut by one or the other of the small crank handles shown in Fig. 1. The cylinder is then returned to the vertical position, the current turned on to the lamp, and the lowering mechanism started. This is done by raising the pawl on the ratchet wheel at the left in Fig. 2, and the rest of the operation is automatic, the current being shut off when the lamp has reached the lowest point in its descent. The downward speed of the lamp may be regulated by the operator, the range being between five seconds and 20 minutes, depending upon the degree of sensitiveness of the blue print paper used.

The lowering and raising mechanism consists of a vertical cylinder, rigidly attached to the upright lamp support and containing a hollow piston rod. There is a fluid for retarding the motion of the piston, and a valve for controlling the flow of the fluid. On top of the piston rod is a shaft carrying two small drums, one of which is connected to the reel just below, operated by the crank handle shown; the other one has connection over the sheave at the top of the standard with another drum at the outer end of the horizontal arm, above the lamp. On the same shaft, on either side of this drum, are two others, around which are coiled the lamp feed wires which also suspend the lamp. Current is supplied to these wires by two small brushes, on either end of the shaft, and indistinctly shown in the engraving. The lamp circuit is closed by a switch on top of the piston rod, and is opened automatically when the piston, in its upward travel, comes in contact with the trigger near the top of the standard. The arc light used is a 15-amp. lamp, for either alternating or direct current, and is made adjustable for several voltages. The apparatus is portable and is made in five regular sizes, special sizes being made to order.

The Miller Locomotive Cab Signal.

The Miller Signal Company, of Chicago, is now equipping 33 miles of the road of the Chicago & Eastern Illinois with track circuits and apparatus for working its block system, by which stop and go-ahead signals are given in the cab of the locomotive, and no fixed signals are required. Eight block sections, on the road named, have had this equipment for a year or more, as has been told in the *Railroad Gazette*. The line now being equipped is between Dalton and Momence, all double track.

The essential features of the Miller system are a track circuit, throughout the length of each block section, as in other automatic systems; short track circuits at the end of each block section; a local battery at the end of each block, with suitable connections by which a current is transmitted to apparatus on the engine, this apparatus being designed to energize one of two incandescent electric lights. One of these lights, showing white, indicates that the block section which governs it is clear, and the other, colored red, indicates that the block section is occupied, or that a switch is wrong or a rail is broken. The current from the roadside battery runs first to a rail of the track, thence to a wheel of the locomotive, thence to the engine apparatus, thence by a wire to the tender, which is insulated from the engine, and through the tender wheels and another section of the track, back to the roadside battery. The indications are given one block section in the rear and are thus in all cases distant signals. An engine passing A gets the indication for the section from B to C. The instruments conveying this signal from B-C to an engine at A are so connected with the track circuit between A and B that if this section is occupied, no clear signal for section B-C can be given. The insulation between the engine and the tender is made of rawhide.

In response to our request, the Miller Signal Company

has sent us the drawings shown herewith. Fig. 1 shows one block section and parts of two others; one from A to B, one in the rear of this, and one in advance of it. An engine is shown at A; there is no train between A and B or between B and C. In the following description the term "block junction" means the termini of two adjacent block sections, in the same track; or, in the ordinary language of automatic signaling a block station.

Figs. 2 and 3 represent modified forms of the engine equipment.

In the first diagram 1 represents the train-carried mechanism; 2, 3 and 4, the block sections; 5 and 5', track equipments for the block-junctions; that is, for stations A and B.

The train-carried, or engine, mechanism, 1, comprises a clear signal 6, and a danger signal 7; a common partial circuit for said signals, consisting of a conductor 8, battery 9 and the armature 10; supplemental partial circuits 11 and 12, ending respectively in contact points 13 and 14. The armature 10, and the poles of the adjacent magnets 15 and 16, are permanently magnetized, the free end of the armature being of the opposite polarity to poles 15 and 16. The solenoids 17 and 18 are differentially wound, and are connected by conductors 19, 20 and 21, with the wheels of the locomotive and tender 22, 23 and 24.

One track rail is divided electrically into sections 25 and 26, separated by insulations 27 and 28; and the other track rail into sections 29 and 30, seperated by insulations 31 and 32; insulations 27 and 31 are opposite each other, and insulations 28 and 32 are staggered; the rail sections 26 and 30 are very short, as shown; the others represent a block section.

The large arrow indicates the direction of train movement, and the right hand end of each block section—the outgoing end—is called the "advance end." The small arrows, numbered, indicate the direction of electric currents and from which battery they flow.

The local or roadside equipment of each block junction is as follows: First, a track battery 33, connected with the advance ends of the rail sections 25 and 29; second, a signal-controlling battery 34, connected with the advance end of rail section 29, and with the rail section 30 and affording with said rail sections a local partial circuit; third, an electro-magnet 35, controlling a pole changing armature 36, vibrating between contact points 37 and 38. This magnet has connection through conductor 39, with the rear end of the rail section 29, on the advance side of the block junction, and through conductor 40 with the rail section 30 of the block junction next in advance; fourth, an electro-magnet 41, having connections through conductors 42 and 43, with the rear ends of the rail sections 29 and 25 respectively, on the advance side of a block junction, and controlling switches 44 and 45, located respectively in a circuit of the signal controlling battery 34 of the advance block junction, and the signal controlling battery 34 of its own block junction; fifth, contact points 46 and 47, connected by common conductor 48, with the advance end of rail section 29.

It thus appears that each conductor 40, extending from one end of a block section to the other, is provided near its rear end with a switch 44, and near its advance end with a switch 45. Should the circuit from track battery 33, in advance of any instrument 41—say 33 at C (not shown) be interrupted, either by a break or by a short circuit, as when a train is in section B C, switches 44 and 45 at B would be opened, 41 being de-energized; and simultaneously the circuits of battery 34 at B and the circuit from battery 34 at C would be broken. The breaking of the circuit of 34 at B would de-energize instrument 35 at A and breaking 34 at C would de-energize 35 at B, thereby causing the pole changing armature 36, of both said instruments 35 to be moved.

With the parts of the track equipment in the position shown, the current from signal-controlling battery 34 of block junction B is from the positive pole of the battery through the contact point 37, armature 36, and conductor 49 to the rail section 30, thence through conductor 40, switch 45, and conductor 40 to A; thence through the switch 44 to instrument 35; thence through conductor 39 and rail section 29, back to the negative pole of battery 34 at B through 47.

The course of the current from track battery 33 at B is through the rail 29 to A, through conductor 42, instrument 41 and conductor 43, and back through rail section 25 to the battery.

When the parts of the train mechanism are in the position shown in Fig. 1 current is supplied from battery 9 to the clear signal 6, as indicated by small arrows.

The differential windings of magnets 17 and 18 are connected in series with each other. Magnet 17 is connected to conductor 20 by conductors 50 and 51. Magnet 18 is connected to track-engaging wheel 22 by conductor 19, and to wheel 24 through conductor 21. When the signal-controlling current is in one direction, it serves to increase the magnetism of the permanent magnet 15, and decrease the magnetism of the permanent magnet 16, and when said current is in the other direction, the reverse is true.

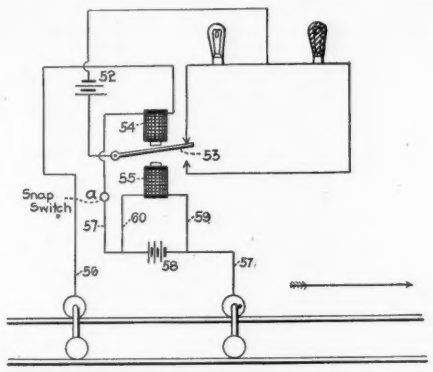


Fig. 2—Engine Equipment with Simple Electro-Magnets.

When the train equipment—that is, the locomotive and tender—reaches the position shown at A in Fig. 1 the local partial circuit formed by battery 34 of the block junction, with the rail sections 29 and 30 is completed through wheels 22, conductor 19, solenoids 18 and 17, conductors 50 and 20 and wheels 23. The track mechanism being in position to give a clear signal, the armature 10 is moved to position shown, or simply held in the position shown, if the previous signal was clear.

Should the engine be moved forward until wheels 23 are in advance of the insulations 27 and 31, the current received by the engine from battery 34, would flow through conductors 20 and 51, solenoids 17 and 18, conductor 21 and wheels 24. This winding being the reverse of the winding in the previous case the action will be the same.

The windings of the local instrument 35, and the engine instrument 17 and 18 are such that a stronger current is required to support armature 36, than is required to move armature 10; so that should the signal battery 34 at any given block junction fail, instrument 35, at the block junction in the rear of said battery, would be de-energized and a danger signal would be given.

Figs. 2 and 3 show other forms of engine mechanism. Fig. 2 shows two electro-magnets 54 and 55, energized by battery 58. The circuit for magnet 55 is completed by conductors 59 and 60, and that for magnet 54 is completed by conductors 57, 52 and 56, and thence through the wheels and a section of the track.

Fig. 3 shows a polarized instrument, similar in design to that shown in Fig. 1, with the additional battery 61. In either Fig. 2 or Fig. 3 a circuit breaker *a* can be put into the circuit so that the engineman can at any moment test his white signal by opening its circuit. Having thus dropped the armature (Fig. 2) he cannot get at it to raise it again, and therefore he will have to run under control until he reaches the next block section. In Fig. 1 the white-light connections can be thus tested by using an auxiliary battery.

The description of the operation of the instruments in Fig. 1, as given in the foregoing paragraphs, may be more easily grasped by condensing, as follows: When an engine reaches the position shown at A, and no train is in section B-C, battery 33, at C, holds 41 at B closed; this closes 34 at B, energizing 35 at A; this closes the circuit from 34 (A) through 37, 49, 30, 22, 19, 18, etc., lighting signal 6.

When block B-C is occupied, 41 at B is open; this de-energizes 35 at A, reversing the circuit from 34 at A, so that if an engine comes along the effect on 17 and 18 is the opposite of what it was before, thus lighting signal 7 instead of signal 6. The presence of a train in section A-B at any time will prevent the transmission of a clear signal from B to A because (through 41 A) it will open 35 A.

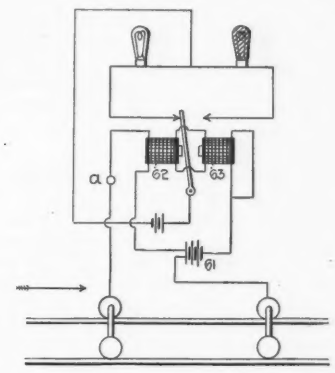


Fig. 3—Engine Equipment with Two Batteries.

It is to be borne in mind that a "danger signal" is not a stop signal, in the sense that it directs the engineman to stop at the point where he sees the signal, or where the signal is; neither is it a distant signal in the sense that it tells him to stop at a certain designated point in advance; the rule requires that on the appearance of the red light the engineman shall immediately take action to bring the speed of his train under control. One or the other of the two lights is constantly alight; indicating, at any moment, what was the condition of the block section next in advance, when the engine passed the roadside apparatus at the entrance of the block section which it is now in. It is not necessary, of course, to have the lights white and red; any two contrasting colors will answer.

Both liquid and dry batteries have been used on locomotives with satisfactory results and current has been taken also from a headlight dynamo. An Edison-Lalande battery of 300 ampere hours, 9 cells, was in good condition after six months' use. With a light requiring four volts, 12 cells of dry battery are used, set up in multiple series.

The President of the Miller Signal Company is H. V. Miller, Telegraph Superintendent of the Chicago & Alton. Others connected with it are W. H. Lyford, General Counsel of the Chicago & Eastern Illinois, Vice-President; A. C. Miller, late Chief Despatcher on the Burlington, General Manager and Treasurer; T. M. Bates, for many years Superintendent of the Alton, Secretary; Willis E. Gray, former General Superintendent of the Alton, and H. D. Judson, Division Superintendent of the Burlington.

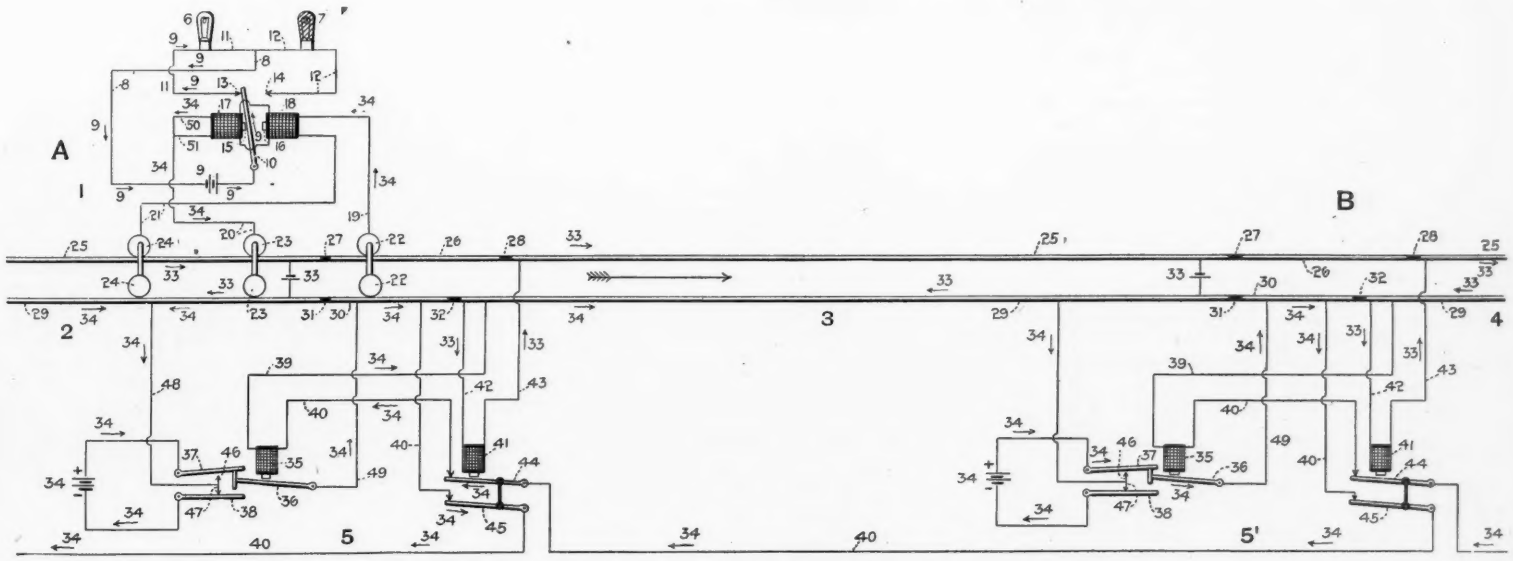


Fig. 1.—Miller Automatic Block System, Giving Indications in the Locomotive Cab.

RAILROAD GAZETTE

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A rather interesting discussion of the question of increasing the braking pressure on loaded cars will be found in the January Proceedings of the Pacific Coast Railway Club (an abstract appears on page 124). Mr. H. H. Forney, General Air Brake Inspector of the Southern Pacific advocated the plan of putting on a second brake cylinder, auxiliary reservoir and triple valve, the brake rigging being strengthened to stand the larger forces. Both brake equipments would be connected to a single system of brake levers and would act when the car was loaded. When the car was empty, one triple valve would be cut out so that the braking pressure would be about 70 per cent. of the light weight of the car as at present. The chief objections to this plan, raised in the discussion, are that the proper working of the brakes depends upon the trainmen to cut in or cut out the second triple, and the cost of the additional equipment would be almost prohibitive. Indeed, it appears to be a clumsy solution considering that it is non-automatic.

It is so common for a Superintendent of Motive Power to be loaded down, or to load himself down, with routine correspondence and petty office work, that little is thought of it. But how much of this office work which now receives the personal attention of the head of the department could be done by an intelligent clerk and such assistants as are generally at hand? Would not the clerks and assistants themselves be better off if they had more responsibility? We shall not here attempt a discussion of questions as old as society, but this subject was again brought to our attention very forcibly a few days ago. In calling on a Superintendent of Motive Power of some 2,500 miles of road, he happened to remark that he now had his office so organized that he had plenty of time to do such things as seemed important. He had time to study the organization of his forces and to study and plan important work. Of course, he is a busy man, but a single example shows how well he has succeeded in putting the routine work on his staff and clerks. Having been away from the road for five days, he found on his return that there were just four letters which required his personal attention; four letters comprised a five-days accumulation of correspondence. Possibly this also throws a little light on another thing; why during the past year he has had many offers from railroads and manufacturing companies. Just now the man who has the ability to direct others is in great demand.

The lamps in the semaphore signals on the Boston & Albany have been changed so as to show white for the all-clear indication and red for stop; and the blades have been put on the right instead of the left side of the post. This makes the indications uniform with those on the New York Central. All of the block signals on the Boston & Albany are disks (automatic), and the indications in these (green for all-clear and red for stop) remain the same as before, though it is likely that these also will soon be changed. In semaphores, the Boston & Albany has used, ever since it first put in an interlocking plant (at Boston in 1883), three lamps for each blade, so that the indication was given by the position or shape of the light, regardless of its color. Two lights side by side, in a horizontal line, indicated "stop," and two lights, one above the other in a vertical line, indicated "all clear." In the home signals the stop indication was given with white lights, and the all-clear indication with green. In the distant signals all the lights showed green for both indications. In side-track or "back-up" signals the light indications are omitted entirely, the blades themselves being made visible at night by means of a lamp, with a reflector, fixed on a bracket at one side of the blade. This change marks the abandonment of a brave but now apparently hopeless experiment. In interlocking, the Boston & Albany was almost a pioneer among American roads, and principles were studied with care and intelligence. To make the night indication correspond with the day signal was an alluring ideal; and twenty years ago such a scheme looked more important than it does now, because the fear of mistakes resulting from color blindness had not then been thoroughly stamped out. The two-light indication was based on the same general theory as the silvered and illuminated semaphore blade, but had the advantage over the latter of being easily made visible much farther away. But as time has passed, experience has shown that single lights, differentiated from one another by color, gave satisfactory service, and no other road has followed the example of the Boston & Albany, so far as we can recall. The Old Colony had a few such signals (about the same time), chiefly at crossings with the Boston & Albany; but that road abandoned them, we believe, several years ago. The officers of the Old Colony said that the two additional lights necessitated increased expense and care, with no compensating benefits. It is regrettable that, in making the present change, the Boston & Albany does not see its way clear to adopt green for all-clear. To use a single white light for go-ahead where, heretofore, two green lights have been used, must, in cities and large towns, introduce a new element of confusion—unless the parts of those cities and towns near the railroad are singularly free from street and house lights.

American Locomotives in India.

"Incidentally there was a good deal of talk about the American engines which have caused all the excitement. The general opinion was that, bad or good from a British mechanical standpoint, they were at least well worth the money paid for them; that their design and materials were excellent, in some particulars better than British, but that their workmanship was generally rough and occasionally downright bad. Their fuel consumption was admitted to be heavy for the work done, but amenable to correction by altering the steam distribution, fire-bars, exhaust pipes, etc. In spite of all the drawbacks, they had proved a perfect godsend at a time when British locomotive builders were unable to offer anything better within any reasonable time. The general opinion of the members knowing anything of the matter was that the outcry had been engineered by certain newspapers and politicians for ulterior purposes, while the British builders took no real interest in the matter of a few dozen engines being ordered from the United States until whipped up to it by certain persons posing as the friends of British trade."

The foregoing paragraph is from a report of the Indian locomotive conference in Calcutta, published in *The Engineer* (London), January 17. The conference was called to consider the motive power needs of railroads in India, and the standardization of motive power was one of the chief topics. We give extracts of the report in general elsewhere in this issue. Editorially, *The Engineer* says that its correspondent

"is an engineer thoroughly acquainted with every phase of the locomotive question which has arisen in India; and he has, furthermore, a competent, practical knowledge of the construction and performance of locomotive engines. His report consequently possesses all the value and interest that these facts would impart. From reading it we hear the opinions of men whose voices have not hitherto been heard, at all events in this country."

The paragraph first quoted contains several things that we have long felt should be said for American locomotives. It also contains some things which should be said no more. We have wished that somebody might state the case fairly from the British viewpoint, and, on the whole, the Calcutta report comes nearer to such a statement than anything we have previously seen coming from British engineers. To say that American locomotives exported to India are well worth the money paid for them; that they are excellent in design and materials, and in some particulars better than British locomotives; and that their alleged extravagance of fuel is subject to correction by the common methods by which all locomotives are adapted to a given duty, comes very near to removing the need of argument in support of the American locomotive builder. It is much more satisfying to have a well-informed Englishman say these things than to be obliged to reiterate what is already known on this side to be true. It is particularly gratifying to say that Americans, so far as we know, had no part in formulating the report from which we have quoted, and that the complimentary expressions cannot have been inspired by American builders, beyond the measure in which "by their fruits ye shall know them" may apply to the matter in hand.

It is believed here that such fair expression need not be confined to locomotives sent into India, but that it could as well be applied to other work sent out from the United States.

The design and material of American locomotives having been thus approved (although *The Engineer* has at times not been as liberal as its correspondent), the questions of workmanship and efficiency of operation remain. The general arraignment of the American locomotive, summarized from an editorial in *The Engineer* of Nov. 15, 1901, is about as follows: Assuming that an American engine can haul heavier loads than an English engine of the same general dimensions, it is accounted for by the assertion that American engines have ¼ in. less steam lap on the valves and ⅛ in. exhaust clearance, where English valves are line-and-line on the exhaust edges; the American locomotive using, therefore, more steam and more coal to do a given amount of work. Holding the American locomotive in mind, it is said that it is quite possible that a locomotive in a ramshackle condition will run as a vehicle with less friction than one in good order, but that *The Engineer* is willing to leave out the frictional explanation of the greater hauling power of the American locomotive, and to rest on the ground that there is nothing left in explanation but the greater average cylinder pressure.

All of this seems insufficient reason for condemning engines as coming from one country or from another, even though the assumptions be correct. Of the correctness or incorrectness of using long steam lap, and some exhaust lap, or at least no exhaust clearance, enough matter to make many volumes has been written. Both sides of the question have been discussed by motive power men and mechanical engineers in this country, and elaborate tests and experiments have been made. Out of the more recent discussion came first the belief that exhaust clearance for high-speed engines gave some advantages, without loss of steam, but that it should be used very guardedly or not at all for comparatively slow and heavy work such as freight. In the latest American practice there has been a tendency to reduce steam lap and give exhaust clearance, particularly in compound locomotives, for both passenger and freight work, believing that the engine thus quickened can pull a given load a given distance in less time, save some fuel and water by being a shorter time on the road, and also compensate in great measure for using steam less expansively, by working at shorter cut-off than the engine with long lap and earlier exhaust closure can. To use the words of an observant locomotive engineer with experience in using valves with 1 in. steam lap (which was afterward reduced to ⅞ in.), the engine with long lap "will not *go* anywhere." His observation was correct; and coal and water were saved in the total after the reduction of lap was made. It borders on truism to say that to expand steam too far in the cylinders of a locomotive makes a sluggish engine; a climb too slow up grade, and a speed too great down grade in the effort to retrieve lost time.

We purposely avoid going into details of wheel diameters, cylinder dimensions, valve travel, and similar vital points, because no great good can come of reopening this question that men are handling cautiously according to their judgment, their experience, and the working conditions which they have to meet.

The Engineer congratulates the Calcutta conference on its avoidance of a renewed "battle of the gages," and it would seem equal cause for congratulation if what may be called the "battle of the valves" be not renewed except to sound an occasional note of caution such as experience may justify. It is not a consideration that should weigh heavily in a competition for opportunity to build the locomotives of the world. As a last recourse in argument, those who order locomotives can have from the builders just what they believe is best in steam distribution as in other things, if they will specify.

Workmanship and finish of materials are in the main good or bad according to the point of view. That "a farmer's wagon will still be quite serviceable after suffering damage that would ruin a court carriage" is a statement of probability that will be

readily endorsed even while it is not apparent how this statement applies to locomotive operations at the present stage of traffic development. A further recent paragraph from *The Engineer*, describing locomotives that have done good work on the continent and are considered good examples of up-to-date practice there, reads as follows: "They are painted black, relieved by brass bands to cover the lagging-plate joints, and these being easily kept clean do much more to give the engine a cared-for appearance than would do continuous wiping down." The age of brass and tinsel is happily gone in the history of the locomotive in the United States, and with it went the laying on of paints of many colors and quantities of gold leaf. Within the memory of almost every motive power man in this country to-day, there were brass steam chest casings, jacket bands, cylinder casings, bell brackets and other trimmings, on locomotives that were painted with all the hues of the rainbow. But men do not look back to that period with pride. There are still a few tons of brass, hidden under a serviceable coat of black paint, on some out-of-date locomotives in this country, but such parts are quietly hurried to the crucible at the first opportunity.

Fanciful locomotive trimming is a dead letter in the United States. The neat jacket of planished steel, symmetry of proportion, stability, speed combined with power, a reasonable fuel economy, ample reserve of boiler power to cover a wide range of work, and finally the most compact machine that can be built to do its part in manufacturing transportation, regarding a railroad as one great machine for that purpose, are the dominant considerations. And yet the typical American-built locomotive excels in appearance the designs of the decorative period as the modern ocean liner in its plainness excels the carved and gilded merchantman of the early days.

Within comparatively recent railroad experience twenty-six dollars worth of gold leaf was striped, lettered, and numbered on the tender of every passenger locomotive of one part of a railroad running from New York to Chicago. Now, a few cents' worth of good yellow paint serves the purpose. The name of the railroad and the number of the engine, easily readable in passing, are sufficient decorations, and it is intended that there shall be little else to attract the eye of the trainman.

In regard to material and workmanship it should be said, first, that American locomotive builders have never felt obliged to admit that British locomotives are the best in the world; on the contrary, they contend with some strength that steel, iron, copper and brass, being the chief materials that make up a locomotive, the American supply and the American use of these metals is unexcelled. If detail specifications are drawn by the buyer of export work the specifications cannot be evaded under contract. If the specifications are general and details are left to the builder, standard materials of the best quality are used as in other work.

American builders maintain that in workmanship and finish of every part that requires finish for convenience and successful operation the American locomotive is as well fitted and finished as any other locomotive. The nature of some of the complaints that have been made is not unfairly illustrated by the following example: On an English order for locomotives, built in the United States, it was insisted by the purchasers that the connecting rod and the side rods should be highly polished. The builders interpreted this as a wish that the surfaces exposed to sight should be polished, and accordingly polished to a high finish the outward side of all rods. When the engines were delivered a prompt protest was received because the inner sides of the rods were not also buffed or hand polished.

That the machining and alignment of American locomotives is inferior is not borne out by any specific facts made known to us. That errors or negligence might on occasion be found, we do not doubt; but that such defects are characteristic we are sure is not the case in engines with which we have had to do. The glittering finish went with the fancy paint and the gold leaf in American practice, but no doubt it can still be had on application by those who think it essential.

An English writer recently said of fitting driving boxes "that a journal may run cool, we must have everything fair and square, a proper amount of side play, sufficient bearing surface, the right kind of bearing surface, and a good suitable lubricant freely fed." No competent locomotive builder will disagree with this general statement of requirements, and it is a good example of what practical men are thinking both here and abroad. The manner of doing the work may differ in detail, but that is not an essential. Within recent years it was customary in some shops in the United States to fit shoes, wedges and driving boxes to a close-scraped fit, with lamp black. A driving box wedge had to be ⅜ in. clear of the pedestal binder, not a bit more or less, when the newly fitted box would slowly fall of its own weight between the shoes. This was insisted upon, although the shoes would have to be taken out and refitted long before the whole travel of the wedge had been used. It is now recognized that no such refinement of fitting is necessary or ever was. We mention these things specifically because they seem to be along the lines of things that have been outgrown in locomotive work here, but upon which or upon kindred things the hostility to the American locomotive abroad seems to be largely based.

In all of this we try to stand clear of prejudice and to base the claims of the American locomotive entirely on its merits. It is not too much to say that American locomotives will not suffer finally by the verdict of the world upon their workmanship and their economy of operation in a large sphere. Nor is it too much to say that American builders even now, flooded with orders for locomotives to be used at home, are ready and able to build locomotives as well, as quickly, and as cheaply as any others, for any duty, in any land.

One of the most eminent railroad men in Austria, Gustav Gerstel, Inspector-General of the Austrian railroads, delivered a lecture Nov. 9, before the Society of Engineers and Architects, in which he urged that a much larger number of men with a thorough technical education should devote themselves to the service of the operating department, which, he says, requires ability of the highest kind, fortified by severe training, but is generally undervalued and neglected. Out of the 4,166 employees in the transportation and telegraph service of the Austrian State Railroads, only 102 have been trained in technical schools. Yet he considers an exact and detailed knowledge of this branch of the service as almost indispensable for those who aim at leading positions. He explained the great complications of freight traffic, and the immense economy obtainable by conducting it and the switching service with good judgment, based on the results of experience. When the first railroads were opened only men of comparatively low intelligence and imperfect training could be had to work them. A consequence was that it was thought necessary to make set rules for every possible contingency, leaving nothing to the judgment of the employee. Every unusual occurrence in operation became the occasion of the issue of a new rule or set of rules, which have accumulated till there is an avalanche of them. It has not been much better in Germany than in Austria, and in both countries dependence is rather on the memory than on the training of the employees. Gerstel illustrated this by the volume of the rules governing the transportation department; they cover 330 pages in Austria, 200 in Germany, and 130 in England. The station and trainmen in the first two countries make a great effort to learn by heart the vast body of rules; and when a case arises, their only thought is to recall the rule which applies, without the slightest thought of the rationality of the course to be pursued. But if anything is to be left to the judgment of employees it is indispensable that they should be trained in exercising it. Mr. Gerstel said that he himself, like most of his colleagues in engineering, formerly looked down upon the transportation department, as below the ambition of an educated man. Against his will he had been forced into it, and soon found that it offered a vast field for the exercise of intelligence, with room for improvement greater than in almost any other department.

NEW PUBLICATIONS.

The Earning Power of Railroads. With Tables Showing Facts as to Earnings, Capitalization, Mileage, etc., of One Hundred Railroads in the United States and Canada. By Floyd W. Mundy (with Granger, Farwell & Co., 71 Broadway). 12mo. 190 pages. Index. New York: Floyd W. Mundy, 1902.

The first 40 pages of Mr. Mundy's little volume are given to developing the theory on which he has written it. These pages deal with income account, operating expenses analyzed into their principal parts, the operating ratio, fixed charges, and stock outstanding in its relation to earning power. The whole theory is directed to this one point—the earning power of the railroad. Much the greater part of the volume is made up of tables of statistics compiled for 100 different railroads, and to certain notes amplifying various points which cannot be expressed in figures in the tables. One page is given to the statistics of each road and these are arranged in a uniform style so that it becomes easy to compare any two roads as regards any selected item. In these tables will be found miles worked, gross earnings and surplus for a period of six years. Then follows a statement of the capitalization, total and per mile; then the condensed income account (the items being given in total and per mile), and a condensed statement of operating expenses given in the same way. Finally, we have the appropriation of gross income (expressed by percentages) to maintenance, conducting transportation, fixed charges and surplus for each of five years; and we have also the ton-miles and passenger-miles per mile of road.

The convenience of such a compilation of statistics will be at once apparent to anybody who has occasion to study railroad reports; as, for instance, we may see at a glance for a given road the relation between gross earnings per mile and expenditure for maintenance per mile; or the relation between total operating expenses per mile and the various items which go to make up that account; or we may compare these and other items across, from one railroad to another and thus get some notion of the relative economy and efficiency with which they are conducted. And, after all, the main object is to make comparisons, as when we are considering the price of securities we have to consider relative values rather than absolute values.

Proceedings of the Ninth Annual Convention of the Traveling Engineers' Association. 214 pages. Secretary W. O. Thompson, Elkhart, Ind.

The Proceedings of this Association have been recently published as edited by W. O. Thompson, Secretary, Elkhart, Ind., and can be had on application to him. The meetings of which this is a record were held in Philadelphia, Sept. 10 to 13, 1901, and, in addition to the record of routine business, there are some interesting discussions and addresses on compound locomotives; also some records of fuel tests that are interesting. The maintenance and handling of the air-brake received attention, and also locomotive lights and their operation.

TRADE CATALOGUES.

"*On the Turtle's Back*" is a magazine of about 150 pages (they are not numbered), with perhaps 100 engravings, published by Mr. J. D. Hawks, President of the Detroit & Mackinac Railway. Its purpose is an exhibit of the industries, the sporting facilities and the charms of the north Michigan country which this new railroad is developing. It is a singular combination of serious studies of the manufacturing and agricultural undertakings already going, and of those capable of development in the great pine denuded lands of Michigan, interspersed with hunting, fishing and other out-of-door tales. This combination is quite like its author, for Mr. Hawks has always contrived to inject into his serious work as an engineer and railroad officer a cheerful love of the woods and the streams and their inhabitants which does not at all detract from the value of the work. The concluding "Letter on Forestry," in the volume, is a clear and valuable statement of a proper application of this generally misunderstood science to the Michigan pine lands, and it should be heeded. This magazine is, presumably, given away to those who are interested and who ask for it—and it is quite worth asking for.

Machinery and Tools.—The Brown & Sharpe Manufacturing Company, Providence, R. I., send their catalogue for 1902. It is the well-known little blue volume, of 440 pages, with a very comprehensive alphabetical index. Of course, the reader knows pretty well what it contains, namely, a great variety of machine tools and of small tools for machinists and engineers.

J. A. Fay & Egan Co., No. 202 to No. 222 West Front street, Cincinnati, Ohio, have just brought out a new complete 450-page catalogue, showing the immense line of machines they are making for working wood. The company has heretofore issued separate catalogues, one for the Fay and one for the Egan departments of their establishments. But to facilitate matters they decided to combine the two, showing every machine they make, together with description and details. This book shows entire outfits for car and railroad shops; furniture, chair and box factories; saw and planing mills, and special sash, door and blind machinery; wagon, carriage and buggy factories; hub, spoke, wheel and handle works; ship-yards, arsenals and technical schools; bridge and agricultural implement builders; trunk, coffin and piano factories, and others. The size and character of this book necessarily prevents an indiscriminate distribution, but the company will forward a copy of it, charges prepaid, to any manufacturer or foreman, or others interested, who will write.

Water Tanks.—Messrs. G. M. Davis & Son, Palatka, Fla., make a specialty of the building of cypress tanks, tubs and vats for all purposes. They also furnish tank towers of steel or wood. They send us a pamphlet giving size, capacity, shipping weight, and price of tanks running from 70 gals. up to 100,000 gals. These tanks are built of cypress lumber; they are hooped either with black steel or with galvanized steel, and the hoops are provided with Techtonius' patent lugs. The details of the lugs and of some styles of tank covers are illustrated in the pamphlet.

The MacPherson Switch & Frog Co., Niagara Falls, N. Y., has just issued a 126-page catalogue. It contains a description of the MacPherson patent safety switch and frog, together with illustrations of a line of frogs, crossings and track tools, made by the company. With the catalogue are some tables useful in the engineering department of a railroad, together with copies of testimonials from several roads which use the MacPherson switch and frog. In a circular which accompanies the catalogue, the company refers to its new Canadian works at Niagara Falls, Ont., which it is expected will be working by May next.

Locomotive Brake-Shoe Tests.

Mr. W. H. Stocks, Master Mechanic of the Chicago, Rock Island & Pacific, describes some tests of locomotive driver brake-shoes on the Rock Island, in a paper before the February meeting of the Western Railway Club. Two makes of shoes were tested, being referred to by letters A and B, and from the following description it will be known who were the makers: "A" is a cast-iron brake-shoe having two curved inserts of very hard white iron disposed along the outer tread bearing portion of the shoe and three similar inserts disposed along that portion of the shoe covering the wheel flange, the center portion of the shoe over the limits of the rail wear being cut away. The inserts presented well defined cutting edges transverse to the wheel tread. The back of the shoe was reinforced with a steel plate to prevent fracture. This plate, however, has nothing to do with the face of the shoe. "B" is a cast-iron brake-shoe having four crucible cast-steel inserts arranged along the outer tread bearing portion of the shoe face and three inserts of crucible cast steel disposed along the flange groove, these inserts presenting well defined cutting edges transverse to the wheel face. The shoe surface was recessed over the limits of rail wear on the tire, while the ends of the shoe were tapered and heavily chilled from the back, the chill being confined to the beveled ends.

In July a service test was arranged and certain engines were equipped with these brake-shoes. Each engine was equipped on one side with the "A" shoe and on the other side with the "B" shoe. The following table shows the results of the road tests in an average wear of 3½ lbs. of the "A" shoe for each 1 lb. wear of the "B" shoe.

Table I.—Service Test for Durability, A vs. B Shoes.

Engine.	Date Applied.	Date Removed.	Loss in Weight. "A."	Loss in Weight. "B."
814.....	7-11-01	11- 2-01	26½ lbs.	7½ lbs.
815.....	7- 6-01	10-12-01	35 lbs.	10½ lbs.
853.....	7- 6-01	10-31-01	51½ lbs.	10½ lbs.
856.....	7- 3-01	11- 2-01	24½ lbs.	11½ lbs.
865.....	7-30-01	12- 3-01	48 lbs.	13 lbs.
			"A"	"B"
Total loss in weight.....			.185½ lbs.	53. lbs.
Ratio of wear.....			3.5 lbs.	1. lb.

On Dec. 2, 1901, the tests were started on the main line southwest of Blue Island, Ill., to compare the retarding power of a set of the "A" driving brake-shoes and a set of the "B" driving brake-shoes similar to those noted in the service test, Table I, and a third set of shoes, "C," which were similar in shape to the "B" shoes, but differed in having the chill omitted from the ends, and an additional insert in both the tread and flange bearing portion. This extra set was introduced for the purpose of determining what effect would result from the omission of the hardened ends and an increase in the cutting effect due to an additional insert.

The test consisted of stopping an engine and dynamometer car, using the emergency application of the driver and tender brakes, while the engine was drifting with steam shut off at nearly as possible the desired speed. Two stops with each set of driving shoes were made with the engine and dynamometer car at 40 miles an hour, and two stops at 65 miles an hour, the endeavor being to always make the stops as nearly as possible on the same stretch of track. Following these tests a train consisting of two baggage cars and four passenger coaches equipped with steel-tired wheels (using unflanged coach brake-shoes unchanged throughout all the tests) were attached to the engine and dynamometer car. Two stops were then made with each set of driving shoes at a speed of 40 miles an hour, and two stops at a speed of 60 miles an hour with the full train. The engine used in this test was No. 858, weighing 65 tons, exclusive of tender, cylinders 19 x 26 in., six drivers, 63¾ in. outside diameter, four-wheel truck, steam pressure 180 lbs.

On the first day, Dec. 2, the weather was clear with a good dry rail. The second day, Dec. 3, in the morning, during the tests with the "C" shoes, the rail was quite frosty and slippery, so that there was considerable trouble in gaining speed. The third day, Dec. 4, was clear, and the rail dry and clean. The rate of grade naturally has some effect on the results of the test in lessening or increasing the lengths of the stops accordingly as the grade was up or down. The records do not indicate a close enough agreement in the distances run under the various rates of gradient to figure definitely the proper correction in order to reduce the stops to a level grade basis. Below is indicated the average grade of the two runs of each set of shoes at the same speed. The only correction applied was that necessary to bring the stops to the same speed for comparison—that is, 40, 60 and 65 miles an hour.

The average results of these road tests are as follows:

Table II.—Service Test for Friction.

Brake Shoe.	Speed—Miles an Hour.	Average Grade—Feet Per Mile.	Length of Stop—Feet.
First Series—Engine and Dynamometer Car.			
A	40	7½ down	1,443
B	40	Level	1,530
C	40	7½ down	1,660
A	65	11½ down	4,363
B	65	17½ down	4,188
C	65	12½ down	4,135
Second Series—Engine, Dynamometer Car and Six Cars.			
A	40	11¾ down	954
B	40	7 down	943
C	40	3½ down	1,177
A	60	16½ down	2,323
B	60	12½ down	2,323
C	60	37½ down	2,714

Mr. Stocks draws the following conclusions from these tests as to the relative merits of the A and B brake-shoes:

First—From a frictional standpoint, which is the greatest virtue in the brake-shoe, there appears no choice.

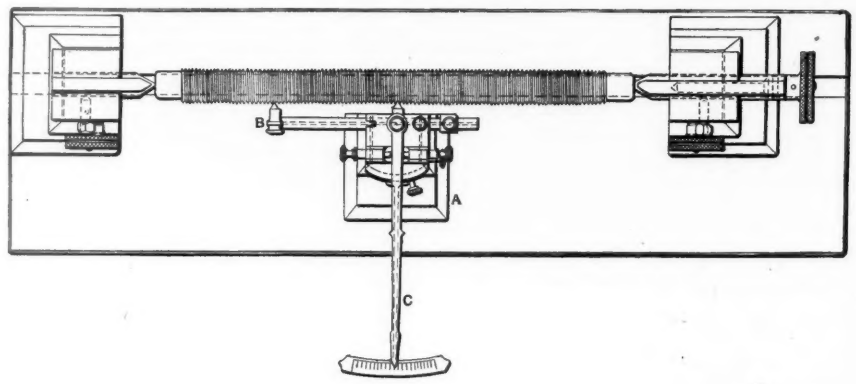
Second—From the standpoint of durability, the "B" shoe, as shown in the service test, has three and one-half times the life of the "A" shoe. It is about 12½ per cent. heavier, which will reduce the advantage slightly, but at the same price per pound it must be far more economical.

Third—As to the action on the tire, there are no records of measurements made to determine the exact effect, but all who have observed the action of the shoes in question agree that the "B" shoes do the best work.

A Thread Measuring Instrument at Altoona.

At the Pennsylvania shops in Altoona is an instrument that was designed and built at the Juniata shops for measuring screw threads, especially threads on staybolts. The accompanying illustrations show a plan and side elevation.

Head and tail stocks with centers are mounted on a firm base, and the center of the tailstock is adjustable, as in a lathe. The indicator is carried by a sliding base A which can be set in any position on the main base of the machine. The sliding base carries two pointers, B and C. A master screw is put on the centers and the two pointers are set at the bottom of two of its threads. The pointer at B is then adjusted until the tail of the pointer C stands at zero of the scale. This scale is carried by an arm attached to the indicator base.



A Thread Measuring Instrument—Pennsylvania Railroad.

When the indicator has been set the master screw is replaced by the screw to be tested, and its variation, to .001 in., from the master screw is shown by the travel of the tail of the pointer C over the scale.

TECHNICAL.

Manufacturing and Business.

The Philadelphia Pneumatic Tool Co. has appointed Messrs. Berger, Carter & Co., No. 330 Market street, San Francisco, Cal., their representatives on the Pacific Coast.

John Brunner, M. Am. Soc. C. E., Superintendent of the Bureau of Engineering and Construction, Department of Public Works, Pittsburgh, Pa., has resigned to accept the position of Assistant General Superintendent of the structural department of the Illinois Steel Co., Chicago, Ill.

Work on the new plant of the Lunkenheimer Co., Cincinnati, Ohio, has been delayed on account of the scarcity of structural steel. The buildings will occupy five acres of land on Beckman street. Eight hundred men will be employed. The move from the old plant on Eighth street can hardly be made before July 1.

J. A. Fay & Egan Co., of Cincinnati, Ohio, have just opened a new branch office at 69 Chapin Block, Buffalo, N. Y., in charge of Mr. B. E. Crafts, who will at once enter into active business operations to further the interests of the company. Mr. Crafts has heretofore represented the firm as salesman for that territory.

Joseph N. Halway, Secretary of the National Safe & Lock Co., died at his home in Cleveland, last week. About twenty years ago Mr. Halway went to Cleveland, where he was engaged with the New York, Pennsylvania & Ohio Railroad, and was for eight years Purchasing Agent for that road. He has been Secretary of the National Safe & Lock Co. for nine years.

F. M. Hicks & Co., of Chicago, have received orders from the Crosette Lumber Co., Hamburg, Ark., for a locomotive; from the Louisiana & Arkansas for two locomotives; from W. C. Morris, of the Kettle Valley Lines, Grand Forks, B. C., for a private car, and from the Northwestern Lumber Co., Eau Claire, Wis., for 10 flat cars, in addition to 15 just received.

The works of the Indianapolis Switch & Frog Co., at Springfield, Ohio, were not destroyed by fire in the great East Street Plant, on Feb. 10, as at first reported. The fire was confined to a portion of the offices which have been re-established at 76 Eastern avenue, Springfield. Business is going on as before and all orders are receiving prompt attention. The company wants catalogues from manufacturers of materials and supplies in its line, to replace those destroyed by the fire.

Messrs. Robert W. Hunt & Co. have been given the inspection of the rails, splice-bars, bolts, nuts and spikes, which the Mexican National Railway Co. has purchased in England and Belgium. They have also been given the inspection of rails which the Louisville & Nashville Railroad Co. has purchased in Germany. John J. Cone, of the firm, will have immediate personal charge of the inspection of this material, and will take with him to Europe a detail of men selected from his firm's American corps of inspectors.

J. B. Wilson, formerly with the mechanical department of the Grand Trunk Railway, has been appointed manager of the new Canadian office of the Standard Pneumatic Tool Co., which has just been opened at 103 Union Station Arcade, Toronto, Ontario. A full line of "Little Giant" pneumatic tools and appliances, repair parts and accessories will be carried, and in the future all machines for Canadian customers will be shipped direct from the Toronto office, thereby saving purchasers the inconvenience of making out manifests and paying duty. The company's business in Canada has greatly increased during the past few months and the outlook is very encouraging.

Last week we stated that F. P. Collier, formerly Western Representative of the Corning Brake Shoe Co., had been made General Sales Agent of the Consolidated Railway Lighting & Refrigerating Co., with headquarters in The Rookery, Chicago. Jno. N. Abbott, Vice-President and General Manager of the Consolidated Railway Electric Lighting & Equipment Co., and General Manager of the Railway Electric Refrigerating Co., asks us to make it clear that Mr. Collier is in no way connected with the two last-mentioned concerns. The General Agent of the Consolidated Railway Electric Lighting & Equipment Co. is Col. Jno. T. Dickinson, 519 The Rookery, Chicago, who is assisted by George W. Carhart.

S. L. G. Knox, at present Engineer in Charge of the Drafting Department and Chairman of the Committee on Mechanical Design, of the General Electric Co., at Schenectady, N. Y., has accepted the position of Chief Engineer and Manager of the Bucyrus Co., of South Milwaukee, Wis., and will assume the duties of his new position in March. Mr. Knox was graduated at Stevens Institute in 1891, and he was for two years Assistant Professor of Mechanical Engineering at Lehigh University. Previous to accepting his present engagement with the General Electric Co. he was with the Crocker-Wheeler Co., at Ampere, N. J. Mr. Knox is a member both of the American Society of Mechanical Engineers and of the American Institute of Electrical Engineers.

Iron and Steel.

A. N. Cleaver has resigned as Treasurer of the Bethlehem Steel Co., and is succeeded by Henry S. Snyder, formerly Secretary.

A. J. Moxham has resigned as General Manager of the Dominion Iron & Steel Co. He will continue as a Director and Vice-President.

Charles H. Wood, heretofore Superintendent of the Toledo, Ohio, plant of the Shelby Steel Tube Co., has been appointed Assistant Manager of the Seamless Steel Tube Co., at Detroit, Mich.

The Wheatland rolling mill of the Continental Iron

Company has resumed operations in all departments. The company has orders enough booked to keep the works in steady operation for months.

An indication as to the rate for carrying ore on the great lakes for the season of 1902 can be had from despatch from Cleveland that Corrigan, McKinney & Co. have contracted for the carriage of 1,300,000 tons at 80 cents.

The Mexican National Railroad order for rails has been placed as follows: Fifty thousand tons with Societe Anonyme John Cockerill, Seraing, Belgium; 25,000 tons with the British Rail Association, and 25,000 tons with the Maryland Steel Company.

Winter shipments of iron ore from the lake docks to the furnace districts of Pittsburgh just now are very light. The tendency last season toward direct shipment from the boats to the furnaces greatly decreased the size of the stock piles at the lake ports and has a noticeable effect upon winter railroad traffic on the ore-carrying roads.

A contract for the shipment of 5,000 tons of Cleveland pig iron has been placed in Glasgow, and a contract for a considerable lot of Cleveland for the Dominion Iron & Steel Company, of Montreal, which is understood to be oversold to the United States, has also been placed at Glasgow. The shipment of Cleveland pig iron to Montreal is the first on record.

Monthly blast furnace statistics published by *The Iron Age*, show that the production of pig iron of all kinds in January was over 1,450,000 gross tons, and yet, in spite of the fact, the stocks in the hands of merchant furnaces declined over 58,000 tons. This is an extraordinary record. The total weekly capacity of furnaces in blast, on Feb. 1, was 340,612 tons.

Albert L. Schultz will resign, on March 1, as head of the operating department of the American Bridge Co., at Pittsburgh. He will be succeeded by Marshall Williams, inspector of shop practice, with headquarters at the Pencoyd Works, Philadelphia, Pa. The Pittsburgh district of the American Bridge Co. embraces all the plants between Philadelphia and Western Ohio.

J. D. Dwyer, for 22 years Superintendent of the Birmingham Rolling Mills, of the Republic Iron & Steel Co., at Birmingham, Ala., has resigned. He will be succeeded by Superintendent J. H. Pritchard, of the Gate City Rolling Mills of the same company. T. P. Walker, formerly assistant superintendent at the Gate City mills, will be appointed superintendent. George Jones has been made Mr. Walker's assistant.

The National Bridge Company of Pennsylvania, which is building a large plant in the Pittsburgh District, was incorporated on Jan. 30. The company will make, construct and erect bridges, buildings, machinery and structures, wholly or partly of iron or steel. The names given as incorporators are: Treasurer, W. H. Conger, Pittsburgh, Pa.; Directors, W. N. Conger, E. M. Schofield, Pittsburgh, Pa.; C. F. Blackman, New York, N. Y.

Francis A. Pratt, for many years President of the Pratt & Whitney Co., of Hartford, Conn., died suddenly of apoplexy on Feb. 10. He was born in Woodstock, Vt., in 1827, and entered the machinist's trade at the age of 15 years. With Amos Whitney, in 1861, he founded the firm which grew into the great manufacturing concern of Pratt & Whitney, the products of which, guns, machines, and tools go to all parts of the world. Two years ago he retired from the presidency, and the concern is now a part of the Niles-Bement-Pond Company. It has a capital of $3,000,000. Mr. Pratt was a member of the American Society of Mechanical Engineers.

Electric Industrial Railroads.

Electric industrial railroads have had much attention from the manufacturers of railroad materials. Among the firms that have given this special attention, and have realized good results in equipping and running such railroads is the firm of Arthur Koppel, of New York. This firm has built many electric roads for industrial purposes and has also developed portable electric railroads which can be laid down and completely equipped in a short time. All the parts are light and easily handled; every detail is carefully worked out and specially constructed, and patented cars for stringing the trolley wire enter into the equipment. These electric railroads have been built by Arthur Koppel in different countries, and for many different purposes. In order to give those who are not well acquainted with this type of railroad an opportunity to get acquainted with industrial electric railroads, their working and their equipment, the firm has put up in its office at 66 Broad street, New York, a model one-tenth actual size. This is equipped with track, overhead system, electric locomotive, and different types of cars.

Baldwin Locomotive No. 20,000.

Messrs. Burnham, Williams & Co. will celebrate, on Feb. 27, the completion, at the Baldwin Locomotive Works, of the twenty thousandth locomotive, and the seventieth year of the company's operation. This locomotive, No. 20,000, is a four-cylinder, balanced compound for the Plant System. The high-pressure cylinders are inside the frames. It is a 10-wheel engine with Vanderbilt boiler and Vanderbilt tender. We hope to be permitted to describe this engine within two or three weeks.

Brown Conveying Plant Near Pittsburgh.

A contract has been given to the Brown Hoisting Machinery Company, of Cleveland, Ohio, to install a complete iron ore handling plant for the new blast furnace of the St. Clair Furnace Company, at Clairton, near Pittsburgh. It is intended that this plant shall be one of the best ever built and the cost will be close to $500,000. There will be a car dumper, two bridges, and two lines of bins 700 ft. long, one line being for iron ore and the other for coke. It is expected that the plant will be finished in time to work the furnaces next fall.

New Railroad Shops.

The Southern Pacific Company will improve its facilities at various points on its system for the building and repairing of rolling stock and has placed with the American Bridge Company, of New York, contracts as follows: Boiler shop at East Portland, Ore.; boiler and machine shops at San Francisco, Cal.; boiler and machine shops at Los Angeles, Cal.; machine shop at El Paso, Texas; machine shop at Houston, Texas. These buildings are all about 120 x 250 ft. equipped with traveling cranes.

At Omaha, Neb., the Union Pacific has begun work on two engine pits, which will be a feature of the large new shop building. When completed the pits will greatly facilitate the construction and the repairing of engines. The pits will be 150 ft. long, 7 ft. wide and 8 ft. deep, with a track directly along the center overhead. They will run lengthwise of the east half of the big shop, one at each end, with 80 ft. of free space between their terminations near the center of the building.

Changes in plans for improvements on the Pittsburgh, Virginia & Charleston Division of the Pennsylvania provide for the transfer of a part of the repair shops, originally planned for the Southside, Pittsburgh, to a point about 10 miles out of the city. This is done on account of the scarcity of room in the city. A site has been selected at Thompson station. Good progress is being made on the Southside buildings included in the improvement plans. It is expected that the new passenger station at Twelfth street will be ready for use about April 15.

It is said that the Wabash is considering locating shops for the Wheeling & Lake Erie at either Steubenville, or at Mingo.

The Subway Explosion in New York.

The Grand Jury in New York has found indictments against seven persons on account of the explosion in the Rapid Transit Subway on Jan. 27. Four of the seven are indicted for manslaughter in the first degree, namely, Major Ira A. Shaler, sub-contractor; Ernest G. Matheson, engineer and superintendent in charge of the work; Joseph Bracken, a foreman; and Moses Epps, the man in charge of the powder house. George E. Murray, chief inspector for the Bureau of Combustibles, and Edward Smith, inspector for the Bureau, were both indicted for criminal negligence in permitting the illegal storage of dynamite.

Lackawanna Steel Company.

The Lackawanna Steel Company, of West Seneca, Erie County, was incorporated in New York State on Feb. 14, with a capital of $40,000,000. The capital is divided into 400,000 shares of the par value of $100 each, and the company begins business with $500,000. The directors are: H. McK. Twombly and D. O. Mills, of New York City; Henry A. C. Taylor, of Newport, R. I.; J. G. McCullough, of North Bennington, Vt.; H. Walters, of Baltimore, Md., and Samuel Mather, of Cleveland, Ohio. The company proposes to make iron, steel and other metals; to operate mines and lumber lands; to erect and operate furnaces, forges, mills, foundries and other manufacturing establishments; to construct and operate bridges, ships, engines, cars and other rolling stock, slips, elevators, waterworks, viaducts, aqueducts and canals, and to transact such other business as may be incidental thereto. The company embraces the interests which were identified with the Lackawanna Iron & Steel Company, at Scranton, Pa. The new plant at Buffalo is not quite ready for operation, but will be soon.

All the material of the old plant at Scranton will be sold on Feb. 25 by the Transit Contract Co., and possession will be given on March 1.

The Block System on the Wabash.

The Wabash is to adopt the telegraph block system on 841 miles of road. Work will be begun at St. Louis and the necessary apparatus will be put in on the lines between St. Louis and Decatur, Bement and Chicago, Tilton and Toledo, Chicago and Toledo, New Haven and Detroit and St. Louis and Kansas City. This department is under the charge of Mr. G. C. Kinsman, superintendent of telegraph. Between Decatur and Tilton, 71 miles, the Wabash has had the block system in use for a number of years. This is the substance of a report which appears in a St. Louis paper. From what we have learned from an officer of the road we conclude that it is substantially correct, though the system cannot be put in force until a new wire is put up; and it does not appear that all of the sections named are to be equipped with the additional wire immediately. We judge, however, that the officers contemplate the establishment of the block system throughout all of the company's main lines within a year or less.

Havana Bridge Works Sold.

The entire plant of the Havana Bridge Company, of Montour Falls, N. Y., has been sold to the Rochester Bridge & Construction Company, of Rochester, N. Y. The Havana Bridge Company was capitalized at $50,000 and its plant is rated as worth about $75,000. There are two main buildings and three smaller buildings, exclusive of an office building. The largest building is the rivet shop, which is 210 ft. long and 80 ft. wide. The plant is fitted with pneumatic machinery and is considered modern in every respect.

The transfer will be made Feb. 24. The Rochester Bridge & Construction Company is in no way related to the Rochester Bridge & Iron Works, which is now a part of the United States Steel Corporation. It was incorporated Dec. 2, 1901, with a capitalization of $40,000. The officers are: President, F. R. Stockley; vice-president, F. W. Sage; secretary and treasurer, James M. Shultz. The contracting manager is G. A. Sears, and the chief engineer is George F. Barton.

The Pennsylvania Tunnels.

The great tunnel enterprise of the Pennsylvania Railroad across the two rivers and Manhattan Island is being pushed with much vigor. The Advisory Commission, the make-up of which we have already told two or three times, meet very frequently, and a number of plans for doing the work have been presented to that Commission. At least six engineers of the first class are preparing plans for doing this work. How many others there may be at work on the matter can only be guessed. The tunnel under the North River will be the longest, and is the one of which people are apt to think as the most difficult. In fact, it is considerably less formidable than the shorter tunnel across the East River because of the depth there to solid rock and the varied and difficult nature of the material which overlies the solid rock.

Standard Specifications for Driving and Truck Axles.

The Master Mechanics' Association committee on a standard specification for locomotive driving and truck axles sends out a circular asking co-operation and assistance in the preparation of a report that will prove acceptable to the members generally. They propose the following questions:

Carbon or Nickel Steel.

1. Give the maximum and minimum limits of tensile strength required in steel axles.
2. Chemical and physical requirements in general.
3. Do you believe in prescribing any particular form of manipulation to insure axles being thoroughly and adequately worked?
4. Is it well to provide that hammers shall be of sufficient size to insure the proper dynamic effect on the axle, i.e., that the weight of hammer shall be proportional to the diameter of the finished axle?
5. Is it advisable to require any subsequent heat treatment after forging to relieve the axle from internal strains, such as annealing, etc.?
6. Assuming you have specifications covering the physical and chemical requirements, what form of tests do you prescribe to determine same, assuming that drop tests are not available for driving and the larger sizes of engine truck axles?
7. Do you favor test pieces for physical tests being taken from the cross-section of axle both at surface, and at a point near the center to be determined, and establish a minimum average or per cent. of difference in elongation between the points so located; or a test piece from the cross-section in the direction of the diameter, to insure adequate and proper workmanship? If so, kindly state distance from center and per cent. difference in elongation allowable.
8. How do you select axles for test, driving axles for instance, so that manufacturer will not know beforehand which axle is to be tested? It is quite easy to check the chemical content of a given heat so as to know that the component parts comply with what is desired, but quite another matter, when drop tests are not available, to prescribe a test that will be a satisfactory measure of the hammer work given, and it is on this point that information is especially desirable.

Iron Axles.

(*a*) Do you believe in prescribing any particular form of manipulation to insure axles being thoroughly and adequately worked.

(*b*) Is it well to provide that hammers shall be of sufficient size to insure the proper dynamic effect on the axle, i.e., that the weight of hammer shall be proportional to the diameter of the finished axle?

(*c*) How do you select axles for test, driving axles for instance, so that the manufacturer will not know beforehand which axle is to be tested?

(*d*) In ordinary iron axles, do you make any tests to determine if steel has been worked into axles? If so, kindly give your practice.

(*e*) What tests do you prescribe to determine quality and workmanship of iron axles?

Any statistical information or improvements in specifications brought about by tentative changes would prove very helpful. Replies are desired not later than March 15, 1902, to A. E. Mitchell, A. S. M. P., C. M. & St. P. Ry., West Milwaukee, Wis.

Bridges for the Chicago, Milwaukee & St. Paul.

The Chicago, Milwaukee & St. Paul has let contracts for a large number of bridges. The Phœnix Bridge Co. has a contract for the construction of 17 truss spans, ranging from 130 ft. to 247 ft. in length, and including one three-hinged arch 210 ft. long, to replace the present bridge over the Menominee River at Iron Mountain, Mich. Contracts have also been awarded to the Wisconsin Bridge & Iron Co. for about 1,500 tons of girder work, and to the Chicago Bridge & Iron Co. for about 1,000 tons of girder work; also to the McClintic-Marshall Construction Co. for some small riveted lattice spans. The truss bridges will be used on the Kansas City cut-off.

Simplon Tunnel.

The water continues to run in the Italian end of the Simplon Tunnel, but the engineers are now satisfied that the flow cannot be permanent. It had been feared that its source was a lake on the mountain, or a well-known mountain torrent, in which case the supply might last as long as the mountain. Now it is claimed to be proved that the source is an underground basin between the limestone and the gneiss, which has been filled by the percolation of rain water, and must be exhausted within a limited period, and will not be a serious obstacle to working the tunnel when completed.

Locomotives for Prussia.

The Prussian State Railroads are said to have let contracts for 755 locomotives, for the aggregate amount of $10,472,000, the contracts being divided among the several Prussian locomotive works according to their capacity. The prices are said to be about 3½ per cent.

below those bid for contracts let last July, which will about equal the fall in the prices of materials. Deliveries are to be completed by April, 1903.

Lansing, St. Johns & St. Louis Railway.

The roadbed and track of the first 20 miles of the new electric road, between Lansing and St. Johns, Mich., has been finished, or about one-third of the track work planned. The road when completed will extend from Lansing to St. Louis, Mich., a station on the Pere Marquette Railroad. Private right-of-way 66 ft. wide will be used throughout. The contract for building and equipping this road is held by the Arnold Electric Power Station Co., Chicago. This road is of unusual interest in that it is built to handle freight as well as passenger traffic; the track and bridge work is in accordance with steam road practice; the road will be operated by its own telephone system and alternating current, high-voltage motors will be used on all the cars. This last is a new departure and the electrical apparatus has been designed by Mr. B. J. Arnold and this will be the first installation of his new alternating current system.

New Office Building for the C. M. & St. P. at Chicago.

The Chicago, Milwaukee & St. Paul expects to erect an office building in Chicago at the corner of Fullerton and Southport avenues, to which it intends moving some of the departments at present in the Old Colony Building. What departments will be moved has not yet been decided. The building will be six stories high, of pressed brick with stone trimmings, and will cost about $60,000.

THE SCRAP HEAP.

Notes.

The Union Pacific is to build a club house, costing $60,000 or more, for the employees of the road at Cheyenne.

At Stoughton, Mass., a street railroad company has been fined $25 on each of seven complaints for not keeping cars suitably warm.

The Pittsburgh, Cincinnati, Chicago & St. Louis has been indicted by the Grand Jury at Louisville, Ky., for failing to provide separate passenger cars for passengers of the two races, white and colored. The portion of this road which lies in Kentucky is only one or two miles long.

On Sunday, February 9, President Roosevelt was taken from New York to Boston over the New York, New Haven & Hartford, in a special train, in four hours, 12 minutes, making the rate of speed, including stops, 54.3 miles an hour. The train started from Harlem River Station, from which point to Boston the distance is 228 miles, or about four miles less than the distance from the Grand Central Station

The newspaper story that the Chicago & North Western would establish temporary telephone communications in one or more cars of its limited trains, while such trains are standing at stations, appears to have been wholly poetical. That is to say, it was based on hope and imagination. But we now read that the Illinois Central has made experiments looking to the use of this idea in the railroad service itself. On a special trip, made by the officers of the road recently near Chicago, telephone instruments were carried, and, at a number of stations, connection was made with the line wire, from the cab of the locomotive, and conversations were held with the train despatcher's office.

The Court of Appeals of Colorado, in a suit involving $300,000, has decided that the Denver & Rio Grande Railroad must pay for losses due to a fire which occurred in Colorado Springs, Oct. 1, 1898. The point of law on which the decision hinged involves the right of an insurance company to recover from the party causing the loss whatever sum it may have had to pay on the policy held. The court declares that the insurance company has a right to sue and recover whatever amount the fire cost it. Further, the court held that if it is proved that the fire originated under circumstances strongly indicating that defendant's engines caused it, it need not be proved absolutely, nor need it be proved absolutely that the fire could have originated in any other way. The evidence shows circumstantially that a spark from a Denver & Rio Grande engine set fire to a pile of debris under a station platform. The platform set fire to a carload of dynamite, and this kept the fire department at bay until the flames spread beyond control. The loss aggregated $400,000.

Traffic Notes.

The "Atlanta Freight Bureau" has been organized by a number of merchants of that city, and it is expected that it will be opened for business within a few weeks.

The *St. Paul Globe*, discussing the Interstate Commerce problems which are now before Congress, suggests that, as few men in the Senate and practically none in the House are competent to deal with the intricate questions connected with this subject, Congress should call into existence a body (meaning, presumably, a special commission) which should be composed of railroad officials and economists, with representatives of the shippers and of the general public (members of Congress). Such a commission could make a report on the whole broad question and present it at the next session of Congress. The Board of Trade and Transportation of New York city has adopted a report which declines to endorse the Corliss Bill for the amendment of the Interstate Commerce Law. It says that the Commission would find it impossible and impracticable to give so much as the most casual examination to all such cases as would come before them for deliberate consideration and decision. "Every such case would involve features most difficult of proper adjustment and decision and would require a careful judicial examination into all facts and details and into all the principles involved and no case could be decided safely and with any assurance that justice would be done to either the carrier or the shipper without such care, investigation and deliberation. It is inconceivable how any commission could perform the duties proposed to be imposed by this bill upon the Interstate Commerce Commission."

An Electric Locomotive Fire on the City & South London.

Mr. Jenkins, general manager of the City & South London Railway, asked as to the cause of the recent accident, informed a Press Association representative that he had examined the damaged mechanism, but could not form a definite opinion of the accident. It probably occurred through defective insulation ignition caused by short circuit. He explained that it was by no means an infrequent occurrence. On this occasion the ignition had been of a serious nature. The advantage of the locomotive system on electrical lines was that whenever an ignition occurred on a locomotive, the engineman in charge could usually put out the tiny flame with ease, say, by using his hat as an extinguisher, but where the motor system was in vogue the danger, as in the case of the recent Liverpool accident, of serious ignition was greater, as the motors were distributed throughout the train, and were not under such immediate control. The traffic was dislocated for about an hour—*Herapath's.*

A New Bridge Over the Neva.

Consul-General Holloway has sent to the State Department from St. Petersburg, plans and specifications for the new palace bridge to be built over the Neva in that city. These are filed in the Bureau of Foreign Commerce, where they may be consulted by architects and engineers. Plans, bids, etc., must be submitted in St. Petersburg by Sept. 1 (14), 1902.

A Fast French Train.

The Northern of France has just put into service a new train leaving Paris four days a week, which runs the 186¾ miles to Calais in 190 minutes with a four-minute stop at Amiens; the first 81¾ miles are booked, start to stop, 79 minutes. This is the world's record for a train of this distance.

Some Furnace Notes.

The following notes on furnace improvements are from *The Bulletin* of the American Iron & Steel Association:

The Youngstown Iron Sheet & Tube Company, of Youngstown, Ohio, has not as yet decided to erect a new blast furnace at Haselton, as has been stated.

The La Belle Iron Works, of Steubenville, Ohio, are tearing down their old stack and will rebuild it at once. The new furnace will be 90 x 20 ft. and will have an annual capacity of 146,000 tons.

The new furnace which Mr. Wharton is erecting at Port Oram, N. J., will be 100 x 21 ft.

The Durham Furnace, at Riegelsville, Pa., is now owned by the Durham Iron Co. The new owners will repair the furnace and put it in blast at an early day.

The St. Clair Furnace Company is now erecting three modern blast furnaces at Clairton, Allegheny County, Pa. They will probably be completed and ready for operation next fall.

The United States Cast Iron Pipe & Foundry Company says that the report that it contemplated erecting two new blast furnaces at Sheffield, Ala., is premature.

The Georgia Iron & Coal Company, of Atlanta, Ga., may erect a new furnace in 1902.

The Colorado Fuel & Iron Company, at Pueblo, Colo., is now erecting two new furnaces, to be known as D and E, which are expected to be completed in July and October respectively.

The Low Moor Iron Company, of Virginia, has not as yet broken ground for its projected furnace at Low Moor. The size of the new stack will be 90 x 19 ft.

Government Ship Building.

Rear Admiral Bowles, U. S. N., Chief of the Bureau of Construction, Navy Department, before the Naval Committee of the House of Representatives, favored the building of warships at Government Navy Yards and asked that he be given authority to build one or more ships. This part of the Naval Appropriation bill has not yet been acted upon by the Committee, but a large number of petitions asking that naval ships be built at Government yards have been sent to Congress during the present session.

Snow on the R. W. & O.

In the general opinion of railroad men there has not been a worse storm in this section for 12 years. There may have been several blizzards that were just as severe in one or two chosen spots, but not one of the same severity and duration that spread itself from Niagara to the Adirondacks without missing a mile and which stayed awake nights and worked overtime. All along the R. W. & O. division, in cuts and valleys and depressions can be found places where the roadway resembles a narrowed section of the Erie Canal with the water out, except that it is cleaner. For miles and miles in some places the traveler sees nothing but a solid wall of snow, as though he were traveling through a very light and very clean tunnel whose extravagant builder had set its sides with diamonds. Many of these snow canals are higher than the roofs of the coaches. There are 18 snowplows on the R. W. & O. division, besides the big rotary, which is in a class by itself. Each passenger train is preceded by a snowplow, generally in the worst storms propelled by two big engines. Behind the engines is coupled a caboose with a flanger, operated from within, which cleans the flanges after the plow has removed the bulk of the snow from the track. Then, usually, behind the flanger, comes the wind, which fills the track up again. Following as closely as safety will admit comes the passenger train. No one, even an employee of the road, is allowed to ride in a snowplow when it is battling with the drifts. The only time that the plow has a human occupant is when a pilot enters the cupola to guide the engineer through towns and over grade crossings, where his view is obscured by the plow.

They did have snowstorms, though, in years gone by. In 1867 the Rome & Watertown road was blocked for 11 consecutive days. The late D. G. Eggleston, a passenger conductor, started from Oswego one Thursday morning and never reached this city until a week from the following Monday. In February, 1875, the Cape Vincent branch was blocked for two weeks and not a train passed over it. The branch was only opened when it had been shoveled out by hand for its entire length. There is comparatively little shoveling now. The huge, slow, irresistible rotary snowplow has superseded the shoveler and can do in hours what he used to do in days. The rotary is a slow-moving creature, but for its own purposes it excels the old-time snow shoveler as a street sweeping machine excels a feather duster. It is pushed into a snow drift, chews it up and spits out the snow in a stream that returns to earth 30 ft. or more from the track. It is a sort of utilitarian combination of the working principles of the Car of Juggernaut and a sausage machine. It doesn't do to get too near to a rotary. A farmer at Furniss wanted to see the machine at work, and climbed a tree about 20 ft. from the track. The stream of snow from the rotary struck the old man, carried him far from the tree and left him with just the top of his head protruding from the snow. The railroad men dug him out of the snow and his pastor lectured him for using improper language.—*Watertown (N. Y.) Times.*

A New Railroad Order in Cuba.

According to certain confused press despatches the Governor General of Cuba appears to have issued an order for the government of the railroads. So far as we can make out, the control of the railroads, and the relations to the State, and to each other, are entrusted to a Railroad Commission consisting of the Secretaries of Public Works, Agriculture and Finance. This Commission may appoint an Inspector General, and the Commission will have power to reject or amend any of the rules and regulations of the companies. The companies will be required also to submit their tariffs to the Commission. Provisional surveys of routes will be permitted before the organization of companies. Preliminary possession of land may be obtained by depositing the approximate value, but condemnation can only be taken through the courts.

Transportation Department—St. Louis Fair.

Mr. Williard A. Smith, Chicago, has been appointed Director of the Department of Transportation Exhibits of the Louisiana Purchase Exposition, to be held at St. Louis, Mo. Mr. Smith held a similar position during the World's Fair of 1893 and was the head of the department of transportation and engineering exhibits for the United States Government at the Paris Exposition.

The Interstate Commerce Commission.

Ex-Senator Pettigrew says that the Interstate Commerce Commission are the paid employees of the corporations that they were appointed to regulate. Not the smallest evidence of the truth of this statement can be furnished. All the accessible evidence on the subject shows that they are the uncompromising enemies of the railroads. At the same time, it is not to be denied that they have refrained from enforcing the interstate commerce law. This neglect of duty has not been due to their receipt of bribes from the railroads; it has been due to their belief that the law cannot be enforced. As a matter of fact the law is a dead letter only because they have failed to do their duty. It prohibits rate-cutting in unmistakable language; it prescribes heavy penalties for the offence; it authorizes the commission to call the attention of the United States district attorneys to violations and to prosecute them vigorously. Were the commissioners to devote as much time and energy to the vigorous enforcement of the law as they do in trying to manufacture public opinion and in trying to induce Congress to give them authority to fix rates, Mr. Pettigrew would have no occasion to advocate government ownership of the railroads as a remedy for rate-cutting.—*Post-Express*, Rochester, N. Y.

LOCOMOTIVE BUILDING.

Mitsui & Co., Japan, have ordered a locomotive from H. K. Porter.

The Western Maryland has ordered eight engines from the Baldwin Co.

The Rutland has ordered 26 engines from the American Locomotive Co.

The Columbia Southern is having a locomotive built at the Baldwin works.

The Arizona & New Mexico is having a locomotive built at the Baldwin works.

The Choctaw, Oklahoma & Gulf, it is reported, has placed an order for 12 locomotives additional with the Baldwin Locomotive Works.

The Chicago & Eastern Illinois recently placed an order with the Schenectady Locomotive Works for 10 consolidated freight engines.

The Chicago Great Western placed an order Feb. 1 for 40 compound freight engines with the American Locomotive Co., February and March, 1903, delivery.

The Chesapeake & Ohio has ordered five engines from the American Locomotive Co. to be built at Richmond, and is considering an order for 25 more consolidation engines.

The Buffalo, Rochester & Pittsburgh has ordered 10 locomotives from the Baldwin Locomotive Works. The same road is having 10 engines built at the Brooks works of the American Locomotive Co.

The Central of Georgia order with the American Locomotive Co. (Cooke Works) calls for 5 simple consolidation locomotives 4 ft. 8½ in. gage; weight on drivers, 172,000 lbs.; total weight, 192,000 lbs.; diameter of cylinders, 21 in.; stroke of piston, 32 in.; diameter of drivers, 55 in.; working steam pressure, 200 lbs.; straight boiler; 379 tubes, charcoal iron, outside diameter 2 in.; length, 14 ft. 5/8 in.; fire-boxes, 123 in. in length, 39½ in. wide, made of carbon steel; tank capacity, 6,000 gals. of water; coal capacity, 10 tons; New York air-brakes; hammered iron axles; Gallager couplers; 18-in. round pattern headlights; Nathan injectors; Prendergast piston and valve packings; Crosby safety valves; Leach sanding devices; Nathan sight-feed lubricators; French springs; steel tired truck wheels; cast tender wheels and steel center wheels.

CAR BUILDING.

The Chilian Government is having three coaches built at the Pullman works.

The Southern Missouri & Arkansas is having 25 freight cars built at the Barney & Smith works.

The Rock Island & Peoria is having 10 coaches built by the American Car & Foundry Co., at Chicago.

The Tennessee Coal, Iron & Railroad Co. has ordered 12 hopper cars from the American Car & Foundry Co.

The American Car & Foundry Co. has received orders from miscellaneous companies for 48 cars of various patterns.

The Wisconsin Central is reported to have placed an order for from 300 to 500 box cars with the American Car & Foundry Co.

The Wheeling & Lake Erie has ordered 600 coal cars from the American Car & Foundry Co., in addition to the order reported last November.

The Pennsylvania has ordered 1,115 box cars from the Illinois Car & Equipment Co., of 100,000 lbs. capacity, with pressed steel under-frames.

The Illinois Improvement & Ballast Co. has ordered 30

gondolas of 80,000 lbs. capacity from the Illinois Car & Equipment Co. The specifications include Miner draft rigging, Illinois Car & Equipment standard tug bolsters and Cardwell brake shoes.

The Chicago Junction order placed with Haskell & Barker, Nov. 15, 1901, calls for from 500 to 650 gondolas of 80,000 lbs. capacity; weight of cars, 28,700 lbs.; length, 36 ft. 1 in. over end sills; width, 9 ft. 4 in. over all; 7 ft. 2 in. high; wooden under-frames; Haskell & Barker axles, bolsters, brake-beams and brake-shoes; triple valve brakes; 5 x 9 M. C. B. brasses; Gould couplers; Williams & Price draft riggings; Haskell & Barker journal boxes and lids; Haskell & Barker trucks, and Haskell & Barker iron wheels.

The Norfolk & Western has ordered 1,000 box and 750 hopper cars from the Southern Car & Foundry Co., Birmingham, Ala. These are of 80,000 lbs. capacity. Length, box cars, 36 ft., hoppers, 27 ft. 6 in. Width, box cars, 8 ft. 6 in., hoppers, 8 ft. 9½ in. Height, box cars, 7 ft. 6 in. Hoppers are to have steel under and side-frames, with wooden hoppers. Box cars to be built of wood throughout. The specifications include N. & W. standard bolsters, brake-beams and brake-shoes, Westinghouse air-brakes, Phosphor Bronze brasses, and N. & W. standard draft rigging, dust guards and trucks.

BRIDGE BUILDING.

ALBION, MICH.—The Detroit & Chicago Traction Co., generally known as the Boland Line, has let the contract to the American Bridge Co. for its bridge at Albion. The bridge will have three spans, 135, 30 and 75 ft. long, with approaches 900 ft. long. This company has in contemplation building a number of bridges on its proposed line across the State. (Jan. 25, p. 65.)

ALLEGHENY, PA.—The Pennsylvania R. R. is about to let the contract for the elevation of its tracks in Allegheny; this work will require a number of bridges. Further details are given in the Railroad Construction column.

ARKANSAS.—The House of Representatives, on Feb. 13, passed the bill previously passed by the United States Senate, extending the time for the completion by the Mississippi River, Hamburg & Western Ry. of the bridge across Bayou Bartholomew, in Arkansas, until three years from the passage of said act. (Jan. 31, page 84.)

On Feb. 13 the House of Representatives passed the two bills authorizing the Memphis, Helena & Louisiana Ry. to build two bridges, one across the Arkansas River and one across the White River, in Arkansas. These bills were passed by the United States Senate last month. (Jan. 31, page 84.)

AUGUSTA, GA.—It is understood that the owners of the Sand Bar Ferry are considering building a bridge at or near their ferry site to abolish the ferry service.

BANGOR, ME.—It is estimated that the wooden toll bridge over the Penobscot between Bangor and Brewer can be replaced with a steel structure at about $60,000. The new bridge to have 30-ft. roadway and one 8-ft. walk. John E. Cheney, Consulting Engineer, Boston, Mass.

BEDFORD, PA.—The County Court has authorized the erection of five new bridges this year as follows: Over Kegg's Creek, in Napier township; over Milliken's Cove Creek, near Mann's Chace; over Elklick Creek, in Southampton township; over Six-Mile Run, in Broad Top township, and over Yellow Creek, near Laysburg. The Grand Jury disapproved the recommendation for a new bridge over the Raystown Branch of the Juniata River, in Bedford. All these bridges will be of iron or steel.

BELLEFONTAINE, OHIO.—The Council has passed a resolution authorizing a bridge over the railroad tracks at Sandusky avenue.

BOISE, IDAHO.—This city proposes to issue bonds for building the proposed bridge at Eagle Island.

BRIDGETON, N. J.—The War Department has ordered the Freeholders of Cumberland County to build a drawbridge across the river at Dividing Creek. It is said it will cost $20,000.

BURLINGTON, N. J.—The Burlington County Board of Freeholders is considering the application for a bridge from Burlington to Burlington Island.

CHARLEROI, PA.—It is said that contracts will be let in a few days for a highway bridge over the Monongahela River between Charleroi and Monessen. The bridge will cost about $160,000.

CHARLOTTE, N. C.—The Seaboard Air Line will build an iron bridge over North Tryon street, near the passenger station.

CHICAGO, ILL.—The following bids were opened Jan. 30 for the sub-structure of a bridge at West Division street: Fitz Simons & Connell, Chicago, $79,482; Lydon & Drews, Chicago. $80,497; Thos. Phee, Chicago, $87,483; Jackson & Corbett Co., Chicago, $92,826; Roemheld & Gallery, Chicago, $102,878.

CODY, WYOMING.—The Chicago, Burlington & Quincy is reported having plans made for a number of new bridges. One, a railroad bridge, will be built over the Shoshone River, near Cody, and a steel highway bridge will be built over the stream at Irma. A bridge will also be built at the Huton crossing, two miles east of Red Oak, Iowa.

CRAWFORDSVILLE, IND.—The date on which W. A. Wallace, Assistant Engineer, Chicago, Indianapolis & Louisville, Chicago, Ill., will receive bids for three bridges, is changed to March 15. The bridges are at Crawfordsville, Gasport and Bedford.

DALTON, MASS.—Bids will be wanted, by March 20, by John Glennon, Secretary of this town, for a bridge over Housatonic River. Estimated cost,, $20,000. Henry L. Norton, Engineer, Springfield.

DES MOINES, IOWA.—An ordinance is before the Council for a viaduct across the railroad tracks on West Seventh or Eighth street.

DOYLESTOWN, PA.—The County Commissioners want bids, until March 10, for building a stone arch bridge in Milford Township.

FORT GIBSON, IND. T.—The House of Representatives, on Feb. 13, passed the bill previously passed by the United States Senate authorizing a bridge across the Arkansas River at or near Fort Gibson. (Dec. 27, 1901, page 898.)

GRAND RAPIDS, MICH.—The Board of Public Works has recommended to the Common Council that the Bridge street bridge, when built, remain upon the same lines that exist at present. The estimates are: $95,300 for a bridge 66 ft. wide, and $119,800 for a bridge 66 ft. wide at the west dock line and 100 ft. wide at the east dock line.

The City Engineer is authorized to estimate the cost of building a viaduct over the railroad tracks at Bartlett street.

GRAND RAPIDS, WIS.—A new steel wagon bridge will be built over the Wisconsin River at Grand River next year. It will consist of four spans and two additional piers, making use of the present abutments and center pier. It will cost about $32,000.

HAMILTON, ONT.—It is urged that if the Grand Trunk Railway Company will not build the bridge across Strachan street, the city should build it.

HARRISBURG, PA.—An ordinance providing for the construction by the Pennsylvania R. R. of a subway at Herr street, is now going through City Council. The same company contemplates the erection of a subway at Union street, Middletown.

The city has opened bids for the construction of a subway at Market street, as follows: Buchanan & Co., Chambersburg (two plans), $1,852 and $1,599; without concrete, $1,526 and $1,273; iron work only, $1,158; Variety Iron Works, $1,765; W. F. Martin, $1,780; E. N. Cooper & Co., $1,740 and $1,490. No award has been made as yet.

HUNTINGTON, IND.—A new bridge, according to report, will be built over Wabash River at Huntington by the electric railroad, which is building into this town.

INDIANAPOLIS, IND.—T. L. Condron, who was engaged by the city to report on the condition of all bridges over White River, has reported to the Board of Works that the bridges at West Michigan street, Morris street, River avenue and at Emrichsville are unsafe and should be repaired at once. It is estimated that the work will cost $10,000.

LAWTON, OKLA. T.—Bids are wanted, until Feb. 28, for building 17 bridges in Comanche County. John S. Lozier, County Surveyor.

LOCKPORT, N. Y.—The New York Central & Hudson River R. R. has given a contract to the Niagara Construction Co. for a concrete arch over Spring street. It will be 200 ft. long.

LONDON, ONT.—Sealed bids addressed to Chas. Talbot, Bridge Commissioner, County Building, London, Ont., will be received until noon, March 17, for two steel bridges to be built over the River Thames. One near the Muncey station, M. C. R., between townships of Caradoc and Delaware, consisting of two spans each 125 ft., center to center, and two spans each 60 ft., center to center, 16 ft. roadway. The other about 5½ miles south of Glencoe, G. T. R., consisting of one span 240 ft., center to center. This bridge is to be designed for a solid concrete roadway 16 ft. wide. At the same time bids will be received for concrete substructures for the above bridges. J. A. Bell, of St. Thomas, Ont., is the County Engineer.

MCKEES ROCKS, PA.—J. A. Atwood, chief engineer of the Pittsburgh & Lake Erie, will award shortly contracts for a new viaduct across the tracks at Turner Station at the lower edge of McKees Rocks Borough. It will be about 500 ft. long and will cross the tracks at a point between O'Donovan and George streets. It will be wide enough for two street car tracks, a driveway and walks. The structure will be of steel and is estimated to cost $50,000.

MECHANICVILLE, N. Y.—The Burke Bridge over the canal will probably not be built before next winter, although the bill for it was passed last year. The new bridge will be of steel. It is quite possible that the Park avenue bridge will be moved to Burke avenue.

MICHIGAN CITY, IND.—The Michigan Central R. R. will build a three-track 200-ft. bridge over the harbor, replacing the present structure.

MILBURN, N. J.—The Delaware, Lackawanna & Western proposes to abolish the grade crossing at Ridgewood road; the Board of Supervisors is considering the application of the railroad.

MILES CITY, MONT.—It is reported that soundings have been made in the Yellowstone River for the proposed bridge which is to cross at Miles City.

MILWAUKEE, WIS.—A resolution is before the Common Council to have the City Engineer make plans and specifications for the proposed West Water street bascule bridge, and estimate of a bascule bridge at Muskego avenue.

MOLINE, ILL.—The Moline, East Moline & Watertown Ry. proposes to build a bridge over the tracks of the Chicago, Rock Island & Pacific at Twenty-third street.

MORGANTOWN, W. VA.—On Feb. 13 the House of Representatives passed the bill authorizing the Central Railway of West Virginia, to build a bridge across the Monongahela River, near Morgantown. (Dec. 20, 1901, page 882.)

MORRISTOWN, PA.—The Royesford & Collegeville Trolley Co. will build a new bridge over the Schuylkill River at Black Rock. The County Commissioners will not let the company operate its cars over the present bridge, which is too frail.

NELSON, B. C.—The Canadian Pacific R. R., according to report, will build a steel bridge over Kootenay River, about four miles from this city.

NEW LONDON, CONN.—The Construction Quartermaster, U. S. A., at New London, wants bids, until Feb. 27, for a lot of work which includes a steel trestle.

NEW PHILADELPHIA, OHIO.—Sealed proposals will be received at the office of the County Commissioners of Tuscarawas County, until March 11, for the coustruction of a stone arch bridge over Little Stillwater Creek, on the road from Uhrichsville to Dennison, Ohio, along what is known as Center street. C. C. Fernsell, County Auditor.

OGDEN, UTAH.—The county officers are considering building a bridge over Weber River between Wilson and Plain City, on a new county road. A. F. Parker, of this city, will make plans.

OWEGO, N. Y.—Two bridges over Owego Creek were recently washed away. The city is considering rebuilding.

PARRY SOUND, ONT.—Alex. Dick has been instructed by the City Council to prepare plans for the substructure of a bridge to be built over the Seguin River.

PITTSBURGH, PA.—As already stated in this column bids are wanted, Feb. 24, by the City Controller, for rebuilding the substructure of the South Tenth street bridge over the Monongahela. The bids for the superstructure are wanted until 10 a.m., Feb. 28. J. Guy McCandless, Director of Department of Public Works.

The House of Representatives on Feb. 8 passed a bill authorizing the St. Clair Terminal R. R. Co. to build and maintain a bridge across the Monongahela River.

The contract for building the masonry piers and approaches to the new Mingo bridge across the Ohio River at Cross Creek for the Wabash R. R., has been let to Arthur McMullen & Co., of New York, at $300,000. The steel work for the superstructure was let some time ago to the American Bridge Co.

An ordinance is before the Councils directing the Department of Public Works to make plans and specifications and prepare to get bids for building the Wilmot street bridge over Four Mile Run.

PLAINWELL, MICH.—The Southern Michigan Traction Co., according to report, will build a bridge over the Kalamazoo River at Plainwell.

RED OAK, IOWA.—See Cody, Wyoming.

RICHMOND, VA.—The E. B. Taylor Co. will build a bridge between Tenth and Eleventh streets in the rear of their factory buildings.

ROCHESTER, N. Y.—A bill is before the Legislature for an appropriation for a bridge over the canal at Meigs street.

ST. JOSEPH, MO.—The House of Representatives has passed the bill authorizing the Chicago, Rock Island & Pacific Ry. to build a bridge across the Missouri River at or near St. Joseph, Mo. This bill was passed by the Missouri Senate in January. (Jan. 31, p. 84.)

ST. PETERSBURG, RUSSIA.—According to reports from St. Petersburg, a former Russian Consulate at Chicago is acting in the interest of Chicago capitalists with a view to carrying out a project for deepening the Neva River so as to permit of large sea-going vessels going up to the Russian capital. The scheme, it is said, also embodies building several large bridges over the Neva.

SALISBURY, MD.—It is proposed to build a bridge across Nanticoke River at Sharktown, between Dorchester and Wickomico Counties.

SAN JUAN, PORTO RICO.—The Assembly has been petitioned by the Mayor of Utuado, asking that a bridge be built over Rio Grande to replace the structure that was destroyed by the cyclone.

Local report says that the road committee has reported on the necessity of bridges at Aguado and other towns.

SEAFORTH, ONT.—The County Council has been requested to build a steel bridge over the Maitland River between the townships of Colborne and Goderich.

SHAMOKIN, PA.—The Grand Jury has approved the report of miners on a new brige over Shamokin Creek at Voigt's Mill, and disapproved the petition for a bridge over Little Roaring Creek in Rush Township.

SPIRIT LAKE, IA.—Bids are wanted April 8 for three iron bridges, two 100 ft. and one 60 ft. long. S. L. Pillsbury, County Auditor.

TECUMSEH, NEB.—Bids are wanted, March 11, at the office of C. H. Cannon, County Clerk, for building all bridges which may be required by the county for the year beginning March 11.

VANCOUVER, WASH.—According to despatches from Tacoma, a committee of the directors of the Northern Pacific R. R. has reported favorably on building a $2,000,000 stone and steel bridge across the Columbia River at Vancouver. A bill authorizing this bridge has been introduced in Congress, and it is said that plans for the bridge have been made.

VICKSBURG, MISS.—Bids are wanted, March 3, for a bridge over Glass Bayou. H. T. Trowbridge, City Clerk.

WEBSTER, MASS.—The question of abolishing the Main street railroad crossing is again under consideration. Willis O. Rugg, of Worcester, last week explained his plans to the Board of Town Officers. He estimates that the work will cost about $170,000. Joseph P. Love is a member of the Town Committee.

WESTMORELAND, KAN.—Bids are wanted, until noon of Feb. 25, at the office of A. P. Scritchfield, County Clerk, for one 70-ft. span steel bridge across Cross Creek, in Emmet Township; also one 50-ft. span steel bridge across Rock Creek, in Rock Creek township; also one 40-ft. span steel bridge across Indian Creek, in Center Township.

WILLIAMSPORT, PA.—The County Commissioners will probably order the building of the proposed river bridge between DuBois and Newberry shortly. The estimated cost is $90,000.

YANKTON, S. DAK.—The House of Representatives on Feb. 13 passed the bill previously mentioned in this column extending the time for beginning work on the combined railroad, wagon, and foot-passenger bridge to be built by the Dakota Southern R. R. Co., across the Missouri River, to March 3, 1903, and the time for completing the bridge to March 3, 1905. (Jan. 17, page 48.)

Other Structures.

ANNISTON, ALA.—The new 300-ton furnace which the Woodstock Iron Co. will build, will cost $125,000. J. W. Woolfolk, manager.

AUSTIN, TEX.—Work will soon be begun on the new passenger station for the Houston & Texas Central. The plans have been approved and bids will be wanted in a few days. The structure will cost $20,000.

BOWLING GREEN, KY.—The Louisville & Nashville is said to have plans in contemplation for extensive improvements in Bowling Green, including yard changes and a new $35,000 passenger station.

CARTERSVILLE, GA.—The Western & Atlantic R. R. will build a new depot in this city.

CHARLOTTETOWN, PRINCE EDWARD ISLAND.—Plans for a new railroad station have been made. The station will be at the foot of Prince street, near where the roundhouse now stands. The roundhouse will probably be placed where the station is now located.

CHESTER, PA.—The Pennsylvania R. R. has plans made for a new station in Chester which will be modeled after the new station at Germantown Junction.

The Tidewater Steel Co. has begun work on its new 50-ton open hearth furnace.

CINCINNATI, OHIO.—D. H. Burnham & Co., architects, of Chicago, are said to be making plans for the new station about to be built in Cincinnati by the Pennsylvania Co.

CLEVELAND, OHIO.—The American Foundry & Machine Co., incorporated, with $200,000 capital stock, has organized with the following officers: C. H. Lane, president; W. W. Wallace, vice-president; C. H. Marr, secretary-treasurer, all of Cleveland. The company has a bonus from the town of Ravenna, Ohio, and is building a plant in that place. For the present the buildings will consist of a main foundry building 125 x 72 ft., machine shop 130 x 88 ft., and a power house. The firm will make mining machinery and undertake custom work in the foundry. Contracts have been placed for a portion of the equipment, but orders are still to be given for boilers, generators, planers, lathes, 10-ft. boring mill, etc.

DALLAS, TEX.—The Dallas Terminal Railroad will spend about half a million dollars in improving the passenger and freight depots, yards, round houses and repair shops in Dallas.

HAZELTON, OHIO.—The Pittsburgh & Lake Erie will let contracts as soon as plans can be made and other details arranged for a roundhouse at Hazelton, Ohio, where large yards are now being built; for a locomotive machine and erecting shop, 170 x 500 ft. in size; a boiler and tank shop, 100 x 285 ft.; a blacksmith shop, 75 x 200 ft.; a freight car repair shop, 150 x 650 ft.; a planing mill and coach repair shop, 120 x 650 ft., and a number of smaller buildings. All but the Hazelton roundhouse will be at the south end of the McKees Rocks yards. (See McKees Rocks, Pa.)

LOUISVILLE, KY.—The plant of the Louisville Bolt & Iron Company was destroyed by fire, Feb. 18, entailing a loss of $100,000. The plant covered two and a half acres, and was one of the largest of its kind south of the Ohio River. It was originally the Anderson Bolt & Iron Company, in Anderson, Ind. Later it was removed to this city, and its name was changed. The plant will be rebuilt at once.

MALONE, N. Y.—Fire in the Rutland machinery shops on Feb. 7 caused considerable damage.

MCKEES ROCKS, PA.—Contracts have been let by the Pittsburgh & Lake Erie to J. A. Stewart & Co., of Pittsburgh, for a new roundhouse and additional shops at McKees Rocks. They amount to approximate $150,000. The roundhouse will have 34 stalls and will be 310 ft. in diameter. The paint shop will be 85 x 200 ft. (See Hazelton, Pa.)

MINNEAPOLIS, MINN.—Two cleaning mills and storage elevator of the Brooks Griffith Grain Co. were burned on Feb. 14. The estimated loss, $60,000.

MONTEREY, MEXICO.—The Monterey Iron Foundry is to be enlarged to double its present capacity, with a view to the making of gasoline engines.

NASHVILLE, TENN.—The Nashville Ry. will build an arcade and transfer station in this city at a cost of about $100,000.

NORWALK, OHIO.—The contract for building the plant of the Norwalk Steel & Iron Co. has been awarded to the Fort Pitt Bridge Co., of Pittsburgh. The main building will be 100 x 460 ft. and 45 ft. high. The officers of the Norwalk Iron & Steel Co. are: J. A. Carnahan, of Canton, Ohio, President; J. G. Gibbs, of Norwalk, Ohio, Treasurer; J. Betty, Secretary; E. E. Erikson, of Pittsburgh, General Manager and Consulting Engineer.

NEW ORLEANS, LA.—Bids are wanted, March 15, for building a brick and steel building at the Naval Station to cost about $46,000. Address the Bureau of Yards and Docks, Washington, D. C.

NEW YORK, N. Y.—The Bush Terminal Co., of New York City, has been incorporated, with a capital of $3,500,000, to construct and maintain piers and wharves, to operate steamship lines, and carry on a general transportation business in Brooklyn. The directors are George Hoffman, A. Dudley Britton, J. H. Dawson, and J. J. Kuhn, of Brooklyn, and Herbert Boughton and T. Horton, of New York city. The company has a water frontage between 43d and 51st streets, South Brooklyn.

PITTSBURGH, PA.—The Pittsburgh Railway's Co. has let the contract to the Providence Engineering Co. for six Rice-Sargent engines with an aggregate of 20,000 horse power, and to the Babcock-Wilcox Co. for boilers aggregating 10,000 horse power. This machinery will be placed in the new central power station, which will be on Brunots Island in the Ohio River, opposite Woods Run. The main building of the plant will be 400 x 200 ft. When the new plant is finished the company will abolish the Birmingham, Suburban, West End, McKeesport and McKees Rocks power stations.

The freight station of the Ft. Wayne road at Tenth street will be replaced by a larger structure. It is said plans are now being made and it is proposed to have the work begun so that it will be finished at the time the tracks are elevated and the new bridge over the river is finished.

T. C. Link, architect, will make the plans for the Wabash passenger terminals in Pittsburgh.

QUAKERTOWN, PA.—Chief Engineer William Hunter, of the Reading Railway, announces that the contract for the new stone passenger station at Quakertown has not yet been awarded. It is possible that the plans may be revised and new estimates taken, but this is not definitely decided as yet.

ROCKFORD, ILL.—The Rockford R. R., Light & Power Co. is receiving bids for building repair shops and storage tracks in Rockford.

RUTLAND, VT.—A new station for the Rutland R. R. at Rutland will cost $150,000. Work will be begun next month.

ST. CLAIR, PA.—The St. Clair Furnace Co., one of the subsidiary companies of the Crucible Steel Co. of America, has let a contract for its ore handling machinery for its new furnace plant at Clairton, Pa., to the Brown Hoisting & Conveying Machinery Co., of Cleveland, Ohio. The plant will consist of a car dumper, two bridges and ore and coke bins each 700 ft. in length. The contract for a bridge across the Monogahela River to connect the plant at Clairton, with the river division of the Pennsylvania Railroad, has been let to the American Bridge Co. The bridge will be nearly 1,000 ft. long and the structural work will cost about $600,000. About 6,000 tons of material will be required.

ST. JOSEPH, MO.—The St. Joseph Light, Heat & Power Co. proposes to build a new power house, 80 x 140 ft., at Main and Felix streets.

ST. LOUIS, MO.—The St. Louis, Iron Mountain & Southern and the Missouri Pacific railroads have bought considerable land in the business portion of St. Louis, where a large freight station will be built for the Gould roads.

SIOUX CITY, IOWA.—It is said plans for a new station for the Chicago & North Western are being made.

SPRINGFIELD, MASS.—The Warren Steam Pump Co., of Warren, has just placed orders for machinery for the new shop which will be built in the spring. The size of the building will be 180 x 80 ft. and will be built of brick. John J. Leech, Supt.

SPRINGFIELD, OHIO.—The Big Four will spend about $200,000 in building a new passenger station and freight houses in this city in the near uture.

STEELTON, PA.—The Pennsylvania Steel Co. is adding a frog and switch department to its plant. The frog shop will be 75 by 700 ft. and the switch shop 80 by 400 ft. There will also be a loading shop, 80 by 270 ft., and a special workshop 150 by 400 ft., where all machine work will be done.

SYRACUSE, N. Y.—Fire, on Feb. 6, partly destroyed the New York Central freight house in South West street.

TROY, N. Y.—The contract for building the new station in Troy for the New York Central & Hudson River R. R. has been awarded to A. Pasquini, of Albany, N. Y.

TUSCUMBIA, ALA.—A. B. Eliott, of Hickory, N. C., has the contract for the new building for the Sheffield shops of the Southern Ry. The price is $50,000.

WAUKESHA, WIS.—J. E. Jones, vice-president of the Waukesha Sheet Steel Co., of Waukesha, Wis., is in Pittsburgh to place contracts for a large amount of new machinery for that plant. The company was organized about a year ago and the new plant started up last year. It is expected that the capacity of the new plant, with the additional machinery ordered, will be doubled. The contracts will reach about $200,000.

WEST ALLIS, WIS.—The Allis-Chalmers Co. has decided to build two additional machine shops at West Allis.

WILMINGTON, DEL.—The Delaware Forge & Steel Co. has recently bought a large tract of land near the Delaware River front, where large works will be built.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xix.)

Canadian Society of Civil Engineers.

At the ordinary meeting, Thursday, Feb. 13, a paper was read by Mr. J. M. Shanly, on "The Construction of the Great Northern Railway of Canada, 1899-1900." It was illustrated by lantern slides.

Air-brake Association.

The annual meeting of the Air-brakemen's Association of America is to be held in Pittsburgh, on April 29, and will continue for three days. About 300 delegates from all parts of the country are expected to be present.

American Society of Civil Engineers.

At the meeting held on Wednesday, Feb. 19, a paper by Walter Loring Webb, Assoc. M. Am. Soc. C. E., entitled "Some Devices for Increasing the Accuracy or Rapidity of Surveying Operations," was presented for discussion.

New York Railroad Club.

The Secretary gives notice that if any railroad member cares to suggest any changes in the present Rules of Interchange, or can present a method of applying repair cards and defect cards to the steel underframes of freight equipment, he is requested to make such recommendation to the Secretary of this Club (168 Montague street, Brooklyn, N. Y.), in writing, not later than March 12.

American Society of Civil Engineers.

A meeting of local members of the Society was held in Washington, Feb. 8, to make arrangements for the fiftieth annual meeting of the Society, which is to be held at Washington, D. C., beginning May 20, on the twentieth anniversary of the last meeting of the Society in that city. The meeting was attended by about 50 of the Washington members of the Society, including a number of officers of the Army Corps of Engineers, and Mr. Charles Warren Hunt, of New York, Secretary of the Society.

The Rocky Mountain Railway Club.

The next meeting of the Rocky Mountain Railway Club will be held at the New St. James Hotel, Denver, Saturday evening, Feb. 22. The papers for discussion were presented at the January meeting, namely, "Locomotive Fuel," and "Terminal Tests of Air-Brakes." Papers to be presented are: "The Western Railway Weighing Association and Inspection Bureau; What is it and for what purpose established; by whom supported and what is the character of its work?" by M. B. Mills, Agent of the Association; and "The Educational Requirements of the Large Locomotive," by F. P. Roesch, Traveling Engineer, C. & S. Ry. The paper by Mr. Mills will be discussed at the February meeting.

Milwaukee Transportation Association.

The railroad men of Milwaukee have organized an association which is called by the above name. The following were elected as officers:

President, George C. Conn, General Agent of the Pere Marquette.

First Vice-President, David L. Bush, Assistant General Superintendent of the Chicago, Milwaukee & St. Paul.

Second Vice-President, James H. Martin, General Agent of the Chicago & North Western.

Third Vice-President, James C. Pond, General Passenger Agent of the Wisconsin Central.

Secretary James Young, General Agent for Wisconsin of the Great Northern.

Treasurer, J. C. McClintock, General Agent of the Western Transit Company.

More than 60 of the 142 who signed the membership lists were present at the first meeting of the association.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. E. L. Corthell has left Argentine and will be in Bern, Switzerland, until Sept. 15, 1902, which may be reached by letter and cable. After that date he will be at No. 1 Nassau street, New York City.

—As stated last week, Mr. H. A. Bishop, Purchasing Agent of the New York, New Haven & Hartford, has resigned. Mr. Bishop's resignation takes effect March first and is for the purpose of accepting the Vice-Presidency of another railroad company. The road he is to go with is not the Northern Pacific, as has been rumored.

—Mr. Virgil G. Bogue is due to arrive at San Francisco, March 10 on his return from New Zealand. It will be remembered that he went to New Zealand a few months ago to make some examinations for a railroad across the main island. His San Francisco address will be in care of George L. Dillman 722 Montgomery street.

—Mr. John S. Kenyon, Secretary of the New York State Board of Railroad Commissioners, died at his home in Syracuse, N. Y., Feb. 16. Mr. Kenyon was born in Schoharie County, New York, in 1843. He held a clerical position in the State Senate as long ago as 1881, and has held numerous other positions, in State offices and in the Republican State Committee, since that time. He was appointed Secretary of the Railroad Commission in 1897.

—Mr. T. A. Allen, Chief Engineer of the Central Florida & Gulf Coast Railway, was born in 1849. For one year (1871-1872) he was a rodman on the Davenport & St. Paul (Iowa). From then until 1884 he held various positions, such as Division Engineer, Assistant Chief Engineer, Superintendent of Bridges and Buildings, and Roadmaster. In September, 1884, he was appointed Chief Engineer of the Peoria, Decatur & Evansville and held similar positions on different roads until 1898, at which time he entered private business. Two years later he became Chief Engineer of the Delaware Valley Construction Company.

—The Superintendent of the Cleveland Division of the Baltimore & Ohio, Mr. J. T. Johnson, was previously General Superintendent of the Cleveland Terminal & Valley Railroad. He was born Sept. 18, 1846, near McConnellsville, Morgan County, Ohio. His railroad career dates from 1864 when he began as a brakeman on the Cleveland & Pittsburgh. He has since held such positions as engineman, freight train conductor and joint yardmaster. In 1881 he became Supervisor of trains of the Baltimore & Ohio, and two years later was promoted to the position of General Superintendent of the Pittsburgh & Western. For one year Mr. Johnson was out of railroad service. On Feb. 1, 1890, he again entered railroad service as General Superintendent of the Valley Railway and its successor, the Cleveland Terminal & Valley. He was also Superintendent of the Akron Division of the Baltimore & Ohio.

—Mr. N. J. Finney, the new Superintendent of the Kansas City, Sedalia & Hannibal, south division of the Missouri, Kansas & Texas, was born at Jamestown, Pa., June 26, 1865. He entered railroad service in 1878 as an office boy in the general office of the Wisconsin Central. From then, until 1888, he served in the capacity of apprentice in the machine shop at Stevens' Point, Wis. He also served in various capacities in location and construction of new lines for that company, later becoming Assistant Superintendent of the Chicago Division. For four years Mr. Finney had no connection with railroads, but returned in August, 1892, as a trainmaster on the Missouri, Kansas & Texas. This position he held for one year, and at the end of that time took a similar position on the St. Louis Division. In 1899 he became Superintendent of the St. Louis & Hannibal north Division, from which position he has recently been promoted to the one above-named.

—Mr. Daniel Hardy, the new General Superintendent of the Missouri Pacific Railway, was, 35 years ago, a water boy on the old single track road running through Frazeyburg, Ohio. A few months later he was made section hand. After a few years in the operator's office he became train despatcher and during the railroad riots of 1887 he was despatcher at the Union Station at Pittsburgh. The following year he left Pittsburgh to go with the St. Louis & Iron Mountain, but after a few years in the West returned to Pittsburgh to become Trainmaster of the Pittsburgh & Lake Erie, but again returned to the West and has since been connected with the Missouri Pacific. In 1899 Mr. Hardy was appointed Superintendent of the Missouri Division of the Iron Mountain at De Soto; previous to this he was Division Superintendent and Trainmaster. Besides these positions Mr. Hardy has seen service as far south as Albuquerque, N. Mex., where he was Division Superintendent and Superintendent of Telegraph for the Atlantic & Pacific. He was located at Sedalia, having been Superintendent of the Gould lines for many years. He will in his new position not only be General Superintendent of the Missouri Pacific, but of its leased and operated lines in Missouri, Kansas, Nebraska and Colorado, with headquarters at St. Louis. Mr. Hardy was born at Dresden, Ohio, Dec. 17, 1848.

—Mr. J. F. Deems has resigned as Superintendent of Motive Power of the Chicago, Burlington & Quincy to become General Superintendent of the American Locomotive Company at Schenectady. Mr. Deems' advancement on the Burlington has been rapid and his success in shop organization and in handling men has attracted much attention. It is generally known that Mr. Deems has been offered several fine positions during the past year, and it has only now been settled which he would take of three places recently offered. All involved large responsibility and were fine fields for a broad man of ability and energy. Mr. Deems was born 1856 in Washington County, Pa., and graduated at the Southwestern Institute of Pennsylvania. During the time he attended college he taught school at odd times beside doing some teaching in the Institute. His first railroad work was with the Baltimore & Ohio as special apprentice and machinist. He then took service with the Chicago, Burlington & Quincy at Beardstown and, after working eight months as a machinist, he was made foreman of a gang and later roundhouse foreman. He was then transferred to a similar place at Galesburg, was next made General Foreman at Beardstown; then Master Mechanic at Ottumwa; Master Mechanic at Beardstown, and Master Mechanic at the Burlington shops. In April, 1900, Mr. Deems was appointed Assistant Superintendent of Motive Power, with headquarters at Burlington, and the following June he became Superintendent of Motive Power, with offices at Chicago.

—Mr. Oliver Harrison Lee died in Elmhurst, a suburb of Chicago, Jan. 31. He was born June 1, 1814, in Colebrook, Conn., and was graduated from the Albany Academy in 1831. He was of old New England stock, his

grandfather and father both having been Congregational ministers in Connecticut. When he was a young boy he decided to become a civil engineer and surveyor and directed his studies to that end so far as he could. When he graduated from the Albany Academy, at the age of 17, he received the highest honors in every class in which he was a competitor and immediately took service under Mr. John B. Jervis, who was then Chief Engineer of the Saratoga & Schenectady Railroad. Lee was immediately under Mr. William C. Young, who was Resident Engineer. After the completion of this railroad he was engaged until September, 1833, on the surveys of the Chenango Canal and then he became Resident Engineer of the Eastern Division of the Utica & Schenectady Railroad, extending from near Palatine Bridge to Schenectady. Here he was again under Mr. William C. Young, who was Chief Engineer. Mr. Lee was then appointed Chief Engineer of the Syracuse & Utica Railroad, which proved to be a very difficult piece of construction. It is said that he had to do very extensive piling through swamps and that he drove piles with steam pile drivers and cut them off with a steam saw. This road was completed and opened for traffic in 1839, when Mr. Lee was appointed Superintendent. In 1841 he resigned and removed to New York City, where he engaged in trade with a brother. In August, 1849, Mr. Lee was appointed Principal Assistant Engineer of the Hudson River Railroad under Mr. William C. Young, Chief Engineer, and the next May he was appointed General Superintendent of the road. This position he held until Sept. 15, 1851, winning the respect of everybody who was at all acquainted with his work. It is said that during his administration there was but one fatal accident to a passenger and that was from the passenger's carelessness. He was obliged to resign this office on account of failing health and was made Secretary; but in May, 1852, he became Chief Engineer of the Chicago & Mississippi Railroad. We have no later record of his life, but feel sure that a good many of the older readers of the *Railroad Gazette* who knew Mr. Lee, and knew of him, will be interested to see even this inadequate sketch.

ELECTIONS AND APPOINTMENTS.

Arkansas Southern.—J. M. Walsh has been appointed General Superintendent, with headquarters at Ruston, La., succeeding J. S. Carglie.

Atchison, Topeka & Santa Fe.—F. N. Risteen has been appointed Mechanical Superintendent of the Eastern Grand Division.

J. F. McNally, heretofore Assistant Division Superintendent, has been appointed Superintendent of the Rio Grande Division, with headquarters at San Marcial, N. Mex.

Baltimore & Ohio.—Master Mechanic J. A. Graham, Lorain, Ohio, will, in addition to his present duties, have charge of all matters pertaining to the Car Department between Cleveland and Wheeling and Cleveland and Lester. F. H. Stark has been appointed General Foreman at Mount Clare and Baltimore Terminals.

Boston & Albany.—The headquarters of T. B. Purves, Jr., Superintendent of Motive Power and Rolling Equipment, will, after April first, be at South Station, Boston, Mass., instead of at Springfield, Mass.

Cape Breton.—J. R. Donnelley has been appointed Superintendent of Motive Power and Car Department, with headquarters, for the present, at Port Hawkesbury, N. S., effective Feb. 15.

Chicago, Burlington & Quincy.—J. F. Deems, Superintendent of Motive Power, with headquarters at Chicago, Ill., has resigned to become General Superintendent of the Schenectady Works of the American Locomotive Company, effective March 1.

F. H. Clark, heretofore Mechanical Engineer, has been appointed Superintendent of Motive Power, succeeding Mr. Deems.

Chicago, Rock Island & Pacific.—The jurisdiction of J. H. Conlen, Division Superintendent, has been extended over the Southern Division from Liberal to the southwestern yard limit board at Herington, including the Dodge City line, to relieve Division Superintendent A. T. Abbott at Herington.

Cincinnati, Hamilton & Dayton.—L. M. Webb has been appointed Assistant General Passenger Agent.

Denver & Rio Grande.—J. H. Abrams, heretofore Trainmaster, has been appointed Acting Superintendent of the First Division, succeeding J. J. Burns, resigned.

Erie.—F. B. Lincoln, Division Superintendent at Arnot, Pa., has resigned.

Fort Worth & Rio Grande.—L. B. Comer, heretofore General Freight and Passenger Agent, has been elected Vice-President and General Superintendent, succeeding W. B. King, resigned.

Grand Trunk.—R. S. Logan, heretofore Vice-President and General Manager of the Central Vermont, has been appointed Assistant to the Second Vice-President and General Manager of the G. T.

Gulf & Ship Island.—Elisha Gee has been appointed Auditor, succeeding A. E. Thomas, assigned to other duties, effective Feb. 15.

Gulf, Colorado & Santa Fe.—J. McDonough has been appointed Acting Master Mechanic, with headquarters at Cleburne, Texas, succeeding T. Paxton.

Lake Shore & Michigan Southern.—H. F. Ball, heretofore Mechanical Engineer, has been appointed Superintendent of Motive Power, succeeding W. H. Marshall.

Leavenworth, Kansas & Western.—H. M. Engelman has been appointed Auditor and Assistant Treasurer, succeeding W. E. Reid.

Long Island.—J. T. Stuart has been appointed Engineer, with special duties to be assigned by the President.

Louisville & Nashville.—J. H. Sanaman, Foreman Car Repair, has resigned.

Mexican National.—At a meeting of the Board of Directors, held recently, E. N. Brown, heretofore General Superintendent, was elected Third Vice-President and General Manager. The title of B. F. Dickson is changed from Assistant General Superintendent to Assistant General Manager. The offices of General Superintendent and Assistant General Superintendent will not be filled, these duties being performed by Mr. Brown and Mr. Dickson, respectively. Fount Rice, Jr., heretofore Roadmaster, has been appointed Acting Superintendent of the San Luis Division, succeeding H. M. Taylor, transferred to other duties.

Missouri, Kansas & Texas.—J. L. West has been appointed Assistant General Freight Agent, with headquarters at St. Louis, Mo., succeeding C. H. Morrill, resigned. W. W. Miller succeeds Mr. West as Assistant General Freight Agent at Kansas City, Mo.

Missouri Pacific.—G. T. Ross, heretofore General Superintendent of the Montana Central, has been appointed Division Superintendent of the M. P., with headquarters at Sedalia, Mo., succeeding D. Hardy, promoted. W. T. Tyler has been appointed Superintendent, with headquarters at De Soto, Mo., succeeding J. R. Wentworth, resigned. R. P. Dalton becomes Superintendent at Van Buren, Ark., succeeding Mr. Tyler, and Mr. Dalton in turn is succeeded by J. A. Swigart, with headquarters at Mer Rouge, La. Mr. Swigart was formerly Trainmaster at Wynne, Ark.

Montana Central.—G. T. Ross, General Superintendent, has resigned. (See Missouri Pacific.)

New York Central & Hudson River.—Owing to the increasing volume of new construction and to the necessity of enabling Division Engineers to give exclusive attention to their Maintenance of Way duties, the following organization is adopted for important contract improvements: The Eastern District includes the Eastern, River, Middle and Marine Sub-Districts, but does not include the changes at the Grand Central Station. The Western District includes the Fall Brook, Beech Creek, Western, Rome, Watertown & Ogdensburg and West Branch Valley Sub-Districts. Contract work of magnitude on each District will be in charge of a Principal Assistant Engineer, reporting to the Assistant Chief Engineer. Each Principal Assistant Engineer will be assisted by a Resident Engineer on each of the Sub-Districts above noted. Each Resident Engineer will be assisted by Assistant Engineers in charge of particular improvements. Henning Fernstrom, heretofore Principal Assistant Engineer, has been appointed Assistant Chief Engineer, with headquarters at Grand Central Station, New York City. William F. Jordan becomes Principal Assistant Engineer of the Eastern District, at 5 Vanderbilt avenue, N. Y. Charles E. Webster becomes Principal Assistant Engineer of the Western District, at Syracuse, N. Y., and Arthur B. Corthell becomes Terminal Engineer Grand Central Station Improvements at 23 East 48th street, N. Y. The Bridge and Building Department, heretofore combined under one Supervisor, has been separated into two Departments, and J. E. Johnson will be Supervisor of Buildings, including fuel and water stations and mechanical plants, and J. I. Banks, Supervisor of Bridges, with headquarters at Mott Haven.

Pittsburgh & Lake Erie.—G. E. Shaw was recently elected a Director, succeeding P. C. Knox, resigned.

Pullman Co.—Edward R. Slagle, heretofore Assistant to the General Manager of the Manufacturing Department, has been appointed Acting Manager of Pullman Car Works, and Thomas Dunbar, heretofore General Foreman, becomes Superintendent, effective Feb. 11.

Reading Iron Co.—F. C. Smink has been elected President, succeeding G. F. Baer, resigned.

Southern.—N. E. Sprowl, heretofore Master Mechanic at Columbia, S. C., has been appointed Master Mechanic of the Washington Division at Alexandria, Va., succeeding C. F. Thomas, transferred.

Southern Pacific.—Edwin Hawley, Assistant General Traffic Manager, with headquarters at New York City, has resigned, effective March 1.

J. A. Muir, Division Superintendent (Pacific System) at Los Angeles, Cal., has resigned.

Texas Midland.—J. E. Leith, General Freight and Passenger Agent, has resigned.

Wabash.—M. Coutant has been appointed Division Master Mechanic, with headquarters at Fort Wayne, Ind.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ARKANSAS WESTERN.—An officer writes that the line from Heavener, Ind. T., to Waldron, Ark., via Cauthron, Ark., a total of 32 miles, is now running, and is fully equipped. Preliminary surveys have also been made for a continuance of the work from Waldron to Hot Springs, Ark., 82 miles beyond, but contracts have not yet been let. C. C. Godman, Fort Smith, Ark., is President and General Manager, and L. C. Torrence, Waldron, Ark., Chief Engineer. The company was incorporated Dec. 15, 1899.

ATLANTIC, VALDOSTA & WESTERN.—Announcement is made that work will begin early this spring on the extension from Valdosta to Moultrie, Ga., 28 miles. This extension was voted at a meeting of the stockholders held last November, and it was proposed eventually to continue the line to some point on the Chattahoochee River on the western line of the State, a distance of 140 miles.

BALTIMORE & OHIO.—Work on the cut-off between Washington Junction, Md., and Adamstown, a distance of about five miles, is reported nearly finished. The route extends to the Sugar-Loaf siding, a mile east of Washington Junction, where a connection is made with the Metropolitan Branch tracks.

BAY OF QUINTE.—Application to the Dominion Parliament is being made by C. A. Millener, Secretary, for permission to extend the company's line from Deseronto, Ont., or a point west, to Prince Edward County, and thence south to a point on Lake Ontario, near Picton, Ont., with authority to increase the capital to meet the above expenditure.

BROOKSVILLE & HUDSON.—Considerable progress is reported on this new line from Brooksville southwest to Hudson, Fla., 40 miles, and track has been laid on 15. As soon as the main line is finished, it is said that a branch will be built to Bayport, on the Gulf of Mexico, by way of Wiscon, a distance of 25 miles. Building is being done by day's work. J. J. McDonough, of Savannah, is President.

BRUNSWICK & BIRMINGHAM.—Col. E. C. Machen, formerly President, has resigned, to become head of an organization known as the Brunswick & Birmingham Construction Co. This company was organized to build the above-named road, and it is now considered likely that work will begin at once. Building has already been done on short sections of the proposed line between the cities named, the estimated length of which is 450 miles. (Feb. 14, p. 121, also Construction Supplement, Oct. 11.)

CANADIAN PACIFIC.—In connection with the recent vote of the directors to issue $19,500,000 of capital stock for new rolling stock and betterments, a circular has been issued to the shareholders, from which the following is quoted: "The extraordinary expansion of the company's business during the last six or seven years, and the apparent certainty that the volume will continue to increase year by year, renders it essential that the company should, with the least possible delay, provide such additional rolling stock and other facilities as may be required for the prompt and efficient handling of its traffic.

"The gradients and alignment on the busy sections of the system should be substantially improved, so that the large and increasing tonnage may be moved with the economy requisite for the best results. . . .

"It is intended that the money thus raised shall be expended for the following purposes: Locomotives, cars, and other equipment, $10,000,000; enlargement of construction and repair shops at Montreal and other points on the system, $2,000,000; reduction of grades, improvement of alignment, and second track where required, $6,500,000. Additional grain elevators, terminals, business and passing sidings and other facilities, such as are being provided from month to month to meet the requirement of the company's business, $4,000,000.

"These estimates over-run the amount of the contemplated issue of stock at par, and . . . it is proposed that $3,000,000 be appropriated from the surplus earnings fund. After appropriating this amount . . . there will be still $8,600,000 in the surplus earnings fund."

CHICAGO GREAT WESTERN.—An officer writes that contract for the proposed line from Rochester, Minn., to Zumbrota, Minn., 27 miles long, has been let to John Grant, of Faribault, Minn. Surveys have also been made of a cut-off from Oelwein, Iowa, to Waverly, 29 miles, in place of the present line, which is about 40 miles long. (Feb. 14, p. 121.)

CHICAGO, ROCK ISLAND & PACIFIC.—An officer denies the report that a line is to be built from Marengo to Rockwell City, Iowa. (Feb. 14, p. 121.)

CHICAGO, ZEIGLER & GULF.—This company has been incorporated in Illinois to build a railroad from a point in Franklin County, through the counties of Franklin, Williamson, Union, Johnson, Massac and Alexander, to Cairo, Ill., with branches northerly through the counties of Franklin, Perry, Jackson, Randolph, Monroe and St. Clair, to East St. Louis, and also from Franklin County, southerly, through the counties of Franklin, Williamson, Johnson, Pope and Massac to Metropolis, on the Ohio River. The directors are: Joseph Leiter, Chicago; W. J. Warr, Hugh Crabbe, J. H. Hume, Sidney Stein and H. H. Platt, of Chicago. The road is designed primarily to open up coal properties in the counties named, for coke manufacture, but it is intended, later, to equip it for passenger service. It is said that it will be built at once.

CHILKOOT PASS.—An officer writes that no work has been done on this new line in Alaska since last year at this time, but that further contracts will be let this coming June. At present, three miles is graded of the route from Dyea, Alaska, north via Canyon City to Sheep Camp, in the Yukon District, B. C. L. D. Kinney, Dyea, is President, and J. H. Diers, Skagway, Chief Engineer.

CHOCTAW, OKLAHOMA & GULF.—An officer writes, in regard to the extension eastward from Guthrie, Okla. T., that it will pass through or near Chandler and the Sac and Fox agency into the Indian Territory. The eastern terminus has not yet been decided on, but it will be at some point on the main line, Ind. T. Contracts have been let to Kahmann & McMurry, of Kansas City, who have all the grading except 25 miles, let to Eby & Stocker, St. Louis, together with the bridging, track laying, masonry, etc. (Feb. 14, p. 121.)

CIMARRON RIVER & TAOS VALLEY.—The newest reports from this projected road in New Mexico, which is to extend from Maxwell City to Elizabethtown, 54 miles, is that grading will begin early in the spring. (Nov. 1, 1901, p. 764.)

CLEVELAND ELECTRIC LINES.—Bids were opened, Feb. 10, by the Cleveland Board of Control for franchises for electric street railroads over 17 routes. Recommendation was subsequently made that the bid of John B. Hoefgen, of Brooklyn, N. Y., be accepted.

DAKOTA ELECTRIC.—This company has been incorporated in South Dakota to build an electric line from Woonsocket to Wessington Springs, Jerauld County, a distance of 16 miles. The incorporators are: E. B. Steer, R. H. Vessey and others, of Wessington Springs and Woonsocket.

DELAWARE ROADS (ELECTRIC).—Rights of way are reported obtained by New York interests for an electric line 35 miles long from Seaford, Del., to Rehoboth Beach, by way of Georgetown, Milton, and other towns.

DENVER, KANSAS & ATLANTIC.—This company was chartered in Oklahoma, recently, with a capital of $15,000,000, to build a railroad system in Oklahoma, Indian Territory, Arkansas and Texas, involving lines from Denver southeast to Marshall, Okla. T., and thence to Paris, Texas, with a branch to Fort Smith, Ark., and numerous other branches. The incorporators are: J. J. Cameron, Albert E. Yerkes and S. D. Cook, of Chicago, and others.

DES MOINES WESTERN.—The firm of F. M. Hubbell, Son & Co., Des Moines, Iowa, incorporated this company, Feb. 10, with capital stock of $300,000, with plans of building from Des Moines west to some point on the Missouri River. No surveys have been made, and the exact route has not as yet been determined.

EL PASO, PHOENIX & CALIFORNIA SOUTHERN.—Grading began Feb. 11 on this proposed line in Arizona, which is to extend from Benson to Phoenix and Yuma. Work was started near Phoenix. M. H. McCord, of Phoenix, is interested. (Oct. 25, 1901, p. 745.)

EUREKA & PALISADE.—See under Railroad News.

KLAMATH LAKE.—This company has filed application in the U. S. Land Office, at Redding, Cal., for right of way over Government lands in connection with the proposed lumber line from a point just over the Oregon border, near Pokegama, southwest to Laird's, on the Southern Pacific, Cal., a distance of 25 miles. This is evidently the same company as that reported Aug. 16, 1901, and in the last Construction Supplement (Oct. 11) as the Klamath Falls.

LAKE ERIE TRACTION.—This company was incorporated in New York, Feb. 12, to build an electric line 10 miles long from Westfield, Chautauqua County, to the Pennsylvania State Line. The directors are: E. A. Ryan, T. H. Paist, D. B. Saxton and others, of Philadelphia and other places.

LANSING, ST. JOHN & ST. LOUIS (ELECTRIC).—For notice of this recently completed electric line in Michigan, see under Technical, this issue.

LOS ANGELES & LONG BEACH (ELECTRIC).—Contract for grading this proposed electric line, 17 miles long, in California, has been let to Robert Sherer & Co. The estimated cost of the line is $1,000,000, and it will be necessary to build a large bridge across the San Gabriel River. The contract for bridge work has been let to J. D. Mercereau. Work is to be pushed, and 60 lb. rails laid as soon as practicable. Major S. H. Finley, of Santa Ana, Cal., is interested. (Construction Supplement, Oct. 11).

MALDEN, KENNETT & SOUTHEASTERN.—This company was chartered in Missouri, Feb. 11, to build a railroad 23 miles long in Dunklin County, between Malden and Ken-

nett, Mo. The directors are R. H. Jones, Virgil McKay, Lee Shelton, and others, of Kennett.

Minnesota, Iowa & Eastern.—This company was incorporated Feb. 11, at Minneapolis, Minn., with a capital stock of $3,000,000, by John Graham and J. W. Sullivan, of Minneapolis, and others. Mr. Graham is President. No plans or contemplated routes have been announced.

Missouri, Kansas & Texas.—This company is reported to have appropriated $400,000 for the proposed extension between Guthrie, Okla. T., and Oklahoma City. Surveys have been made. (Feb. 7, p. 104.)

Missouri Pacific.—Deeds for the transfer of five blocks of ground in South St. Louis for St. Louis, Iron Mountain & Southern terminals, were recorded at St. Louis, Feb. 14. It is said that the whole of this tract will be used for a switching yard, work on which is to begin at once. The consideration was $825,000.

Mobile & West Alabama.—It is said that contracts for the first 50 miles of this new line, which is projected from Mobile to Florence, Ala., with a branch to Birmingham, will be let during March. Surveys are now being made. Judge H. Austill, Mobile, Ala., is President.

Nashville & Gallatin.—Charter for this company was filed at Nashville, Tenn., Feb. 6. It is proposed to build an electric line between the points named, a distance of about 30 miles, which is at present covered by the Louisville & Nashville. The incorporators are Chas. W. Ruth, Frank Haskell, Jas. H. Connor, and others.

New York and Jersey.—This is the corporate name of the company referred to Feb. 14 as the Jersey City & New York. The papers were filed at Albany on Feb. 11, with authorized capital of $8,500,000, to take over the company formerly known as the Hudson Tunnel Ry. Co., and the directors are Chas. H. Russell, H. L. Sprague, F. B. Jennings, Howard van Sinderen, W. H. Stevens, and others, of New York and other cities.

New York Central & Hudson River.—Surveys are reported for an extension of the Pennsylvania Division, 50 miles long, from the present terminus, by way of Brookville, East Brady and Karnes City, where a connection will be made with the Pittsburgh & Western.

New York, New Haven & Hartford.—Work began, Feb. 11, on the "Y" track which is to connect the Waterbury, Meriden and Middletown line with the Northampton Division. The track to be laid is 1,600 ft. long, and work is being done by the company's forces, in charge of Superintendent Davidson, of the Hartford Division. It is expected to open the connection by summer.

Northampton (Lehigh & New England).—A mortgage for $300,000 to the Fidelity Trust Co., of Philadelphia, was filed by this company, Feb. 17. The company is chartered to build from Martin's Creek, Pa., to Bath, 12 miles, forming a connection between the Lehigh & New England and the Pennsylvania. William J. Turner, President of the L. & N. E., is also President of the Northampton.

Northern Pacific.—Favorable report has been made by a committee of directors for building a steel and stone bridge, at an estimated cost of $2,000,000, across the Columbia River, at Vancouver, Wash. This is in connection with the recently completed line down the north shore of the Columbia from Kalama to Vancouver, 35 miles. It is the intention of the company to build a new line into Portland as soon as the bridge is completed, abandoning the present route on the Oregon side of the Columbia. A bill has been introduced in Congress to permit the bridging o the river.

North Shore.—It is said that this company, successor to the North Pacific Coast, will spend $1,000,000 in general rebuilding and betterment of its line, which extends from San Francisco, Cal., to Cazadero, a distance of 87 miles. Plans were formulated at a meeting of the directors, Jan. 27. Electricity is to be substituted for steam as motive power, double tracks laid, a 4,000-ft. tunnel built, and the line made standard gage throughout. Twenty-one electric cars of special design will be ordered in the East. The work will be under the general supervision of the new General Manager, J. A. Fillmore.

Ohio Northwestern (Electric).—Contract to build this new electric line in Ohio from Fostoria to Mungen, 18 miles, has been let to the Consolidated Ry. & Light Co., of Philadelphia. Mortgages have been filed to secure bonds for $350,000, issued to cover the cost of building.

Osceola, Monegaw Springs & Western.—An officer writes that arrangements to build this proposed line in Missouri are not yet complete, but that surveys are completed and the prospect of immediate building is good. The work is easy, with the heaviest grade 2 per cent., and short. There are no iron bridges, but there will be two trestles, 500 and 380 ft. long. A. E. Shure, of Monegaw Springs, is President.

Pennsylvania.—Bids for track elevation at Allegheny, Pa., are asked, Feb. 25, by Chief Engineer Rodd. This is for work on the line of the Pittsburgh, Fort Wayne & Chicago, and involves a four-track system, and the lowering of the grades of six streets and avenues. The work will be done between the Allegheny Bridge and River avenue, Allegheny, and the estimated cost is between $2,000,000 and $3,000,000.

Pennsylvania, New Jersey & New York.—This is the corporate name of the Pennsylvania's new tunnel under the Hudson River. It was incorporated at Trenton, N. J., Feb. 13, by A. J. Cassatt, Samuel Rea, J. P. Green, E. F. C. Young, F. W. Jackson, F. L. Sheppard and William Bettle.

Santa Fe, Prescott & Phoenix.—Surveys are reported complete for the proposed Prescott & Eastern extension from Mayer, Ariz., to the Crowned King mines, Yavapai County, a distance of 27 miles. Rights of way have been obtained, and it is said that work will begin about the first of April.

South Carolina & Georgia Extension.—Work is reported in progress by a large force, grading, beyond Marion, S. C., the present terminus of the line, for an extension across the Blue Ridge to coal fields and to a connection with the Louisville & Nashville, or other railroad, for traffic to the Ohio River. The line is at present in operation between Camden and Marion, S. C., 171 miles.

Southern Pacific.—It is said that work will begin shortly on the proposed extension of the Caney Valley, 17 miles out of Van Vleck, Tex. Surveys have been made, and rights of way are being secured. The work will be in charge of Major Boschke, chief of the construction force, and it is estimated that the extension can be built in 60 days after ground is broken.

Texas & New Orleans (Southern Pacific).—Contract for further grading on the Neches River, Jacksonville, Texas, extension has been let to Tansy Bros., of Jacksonville. Work on a 12-mile section at Jacksonville was reported in progress Dec. 27, 1901, by the same contractors. This newest section is from Mahl, nine miles north of Nacogdoches, La., to the Angelina River, 18 miles.

Texas Midland.—An officer denies current press reports to the effect that the line is to be extended to Beaumont, Tex.

Texas Roads.—The Central Coal & Coke Co.'s lumber line from Lufkin, Texas, on the Houston East & West Texas to lumber mills, 28 miles west, is reported completed. The present terminus is the lumber camp of the company building, but it is proposed to extend it to Crockett before long. McCabe & Stein were the contractors. The Central Coal & Coke Co. may be addressed at Philadelphia, Pa.

Union Pacific.—Contract for rebuilding certain sections of the line west of Cheyenne, Wyo., for which bids were opened, Jan. 31, has been let to the Utah Construction Co. The work includes reduction of grades, widening of banks, straightening of curves, etc. (Feb. 14, p. 122.)

Velasco, Brazos & Northern.—Surveys are reported for an extension from Anchor to Sugarland, Tex., 20 miles. It is said that the line from Velasco to Angleton will also be relocated in order to reach more directly certain large sugar properties. The Velasco, Brazos & Northern was incorporated last July as a successor to the Velasco Terminal Co. I. H. Kempner, D. B. Henderson, and others, are directors. (July 12, 1901, p. 508.)

Vicksburg & Southeastern.—Surveys for this proposed line in Mississippi from Vicksburg, 130 miles southeast to Hattiesburg, which commenced last September, are reported completed. The road is to run through Warren, Hinds, Copiah, Lawrence, Marion and Perry counties. Capt. R. N. Engle, Vicksburg, Miss., is Chief Engineer.

Wabash.—Contract for the masonry piers and approaches to the new Mingo bridge across the Ohio River were let recently to Arthur McMullen & Co., of New York. The steel superstructure was previously let to the American Bridge Co. It is provided that the substructure must be completed by August 1, 1902. This completes the contracts for the Ohio River and Pittsburgh extension, and brings the work up to rebuilding the Wheeling & Lake Erie between Toledo and Mt. Jewett, Pa., for which contracts are likely to be let soon.

Western Maryland.—Surveys are to be made by this company for a new route through the Blue Ridge Mountains, as an illustration of what could be done to increase the train load limit by a purchaser of the road. The project would involve building about 25 miles of line, including a tunnel nearly two miles long. The engineer corps, prior to being disbanded, has received orders to survey the line between Hagerstown and the crossing of the Monocacy River, with a view to reducing grades, and to determine the practicability of a low grade crossing of the South Mountain.

West Jersey & Seashore (Pennsylvania).—On account of the refusal of the town of Absecon, N. J., to permit the West Jersey & Seashore to elevate its tracks there, a new survey is being made from Pomona across the meadows to North Pleasantville, leaving out Absecon entirely. It is proposed to use this for express traffic.

Woodward & Quanah.—An officer of the Chicago, Rock Island & Pacific denies that this new incorporation is in the interest of his company. (Feb. 14, p. 121.)

Wooster & Mansfield Electric.—This company was incorporated in Ohio, Feb. 4, to build about 100 miles of electric line in Wayne, Holmes, Ashland, Richland, Tuscarawas and Knox counties. It is proposed to run the main line from Wooster to Mansfield, with branches from Shreve to Lakeville, through Millersburg and New Philadelphia, and from Lakeville to Mount Vernon. Other branches are also contemplated. The incorporators are David Collier, W. A. Craig, J. B. Keys and others.

Yukon Pacific.—Application is being made to the Dominion Parliament for incorporation of a line from a point on or near the Chilkat River, on the International boundary between Alaska and British Columbia, to a point at or near Rainy Hollow, B. C., and thence northeast to the Yukon, near White Horse. F. H. Chrysler, Ottawa, is the Solicitor.

GENERAL RAILROAD NEWS.

Baltimore, Pittsburgh & Western.—From present indications, the bill introduced in the Maryland Legislature, Feb. 3, for incorporation of this company, seems to tend to a promoters' scheme. It is evident that the bill, if it gains any headway, will have a strong opposition, and the whole matter grows out of the offers to buy the Western Maryland, of which much has been said lately. One of the bidders is represented by Mr. Crain, of the law firm of Crain & Hershey, who took the bill for the incorporation of the B., P. & W. to Annapolis. The general supposition seems to be that it has been introduced to force a sale of the Western Maryland.

Brooklyn Rapid Transit.—A special meeting of stockholders is called for March 20, to discuss a mortgage to secure bonds for an amount not to exceed $150,000,000. This is to be called the General Consolidated and Collateral Trust Mortgage, and the bonds are to bear interest at a rate not to exceed 4 per cent. per annum. "They may be used, other than those necessary for the retirement of outstanding bonds, only for the purpose of acquiring additional property and securities. The Brooklyn Rapid Transit Co. is a securities holding company, and the mortgage is to cover all the stocks and bonds and other property of every description now owned or hereafter to be acquired, subject only to the lien of the present Brooklyn Rapid Transit $7,000,000 mortgage, provision for the retirement of which, as well as of the outstanding bonds of the other companies of the Brooklyn Rapid Transit system, at maturity, or sooner, is made in the proposed mortgage.

"In recommending to stockholders a mortgage for so large an amount the directors have considered the rapidly increasing growth of Brooklyn and the country adjacent, and the present inability of the company's elevated and surface railroads to properly fulfil their duties to the public without a large increase of power, equipments, improvements, and extensions. . . .

"The directors also believe that one class of bonds eventually covering the entire system by replacing all other liens . . . will simplify and strengthen the company's finances."

Chesapeake & Ohio.—J. P. Morgan & Co. offer the holders of the general mortgage 4½ gold bonds, issued to take up the $3,007,000 Elizabethtown, Lexington & Big Sandy first mortgage bonds, due March 1, 1902, the privilege of exchanging their holdings at par and interest to maturity for Chesapeake & Ohio general mortgage 4½ gold bonds at 107½, plus accrued interest.

Cincinnati Northern.—The Guaranty Trust Co. has issued a circular stating that the reorganization of the Cincinnati Northern properties has been effected, for which bonds of the Cincinnati, Jackson & Mackinaw were called in, last year, and certificates given by the Central Trust Co. The debts of the Cincinnati Northern have been paid, to the amount of $185,273; capital stock has been reduced to $3,000,000, all of which is common, and an issue of $3,000,000, first mortgage, 50-year, gold 4s has been authorized, of which $1,000,000, with the entire capital stock, is now to be distributed, pro rata, among the depositing certificate holders, the remainder being reserved for future betterments. (Dec. 14, p. 122.)

Connecticut Roads (Electric).—A combination has been effected between the interests of the Connecticut Railway & Lighting Co., and the Meriden, Southington & Compounce electric road, extending from Meriden to Lake Compounce and operating about 30 miles of line. This effects another link in the paralleling, under one management, of the New York, New Haven & Hartford by electric lines between New York and Boston.

Erie & Central New York.—This road, extending from Cortland to Cincinnatus, N. Y., 18 miles, and projected about 90 miles further, has been ordered sold by the United States Court, to satisfy a mortgage foreclosure brought by John P. Bland, trustee, successor of the Hamilton Trust Co., of Brooklyn. The sale is ordered for March 29, at Cortland, and no bid of less than $50,000 will be received.

Eureka & Palisade.—Possession of the Eureka & Palisade Railroad was entered into, Feb. 1, by the Eureka & Palisade Railway Co. The former property was sold at public auction last July, and bid in for $300,000 by C. H. Abbott, representing the new organization. The directors of the operating company are: M. L. Requa, H. H. Taylor, H. M. J. McMichael, C. Read and C. L. Rood. Mr. Requa has been elected President, and G. D. Abbott Superintendent, with office at Palisade, Nev.

Gulf & Ship Island.—The stockholders, at a special meeting, Feb. 7, authorized the execution of a new first refunding and terminal mortgage for $5,000,000, to secure an issue of 50-year 5 per cent. bonds, issued at the rate of $20,000,000 per mile; $2,750,000 of this is to be applied to refunding existing indebtedness, and the remainder reserved for betterments, additional equipment, etc.

Maryland & Pennsylvania.—The necessary steps for reducing the mortgage from $2,700,000, the total amount authorized, to $1,200,000, have been taken, and the papers have been placed on record. The Mercantile Trust Co. is trustee under the mortgage. The line extends from Baltimore to Cardiff, Md., 43 miles, and from York to Delta and South Delta, Pa., 37 miles, with branches bringing the total to 91 miles. J. Wilson Brown is President.

Metropolitan Street (New York).—The following plan for rearrangement of the company's finances has been announced, in connection with the proposed electrical equipment of the remaining 80 odd miles of horse car lines in New York City: The Metropolitan Street Ry. Co. is to be leased to the Interurban Street Ry. Co., which is, in turn, to be controlled by a new company incorporated, Feb. 14, known as the Metropolitan Securities Co. Operation to remain in the present hands.

The Metropolitan Securities Co. has been organized under the laws of New York, with a capital of $30,000,000, underwritten at par by Kuhn, Loeb & Co., and its directors are: Wm. H. Baldwin, Jr., E. J. Berwind, P. D. Cravath, T. P. Fowler, G. G. Haven and M. L. Schiff. It has acquired all the outstanding capital stock and other securities of the Interurban Co., which has an authorized capital stock of $20,000,000, and owns valuable franchises for street railroads on an extensive mileage in the Bronx and adjacent territory.

The Interurban Co. will lease the Metropolitan Street Ry., assuming its fixed charges, and unconditionally guaranteeing 7 per cent. per annum upon its capital stock. It will also pay $23,000,000 to the Metropolitan Co. for the securities liberated by the payment of the unfunded debt and other assets now almost wholly unproductive. This money will be expended in liquidating the unfunded debt and in completing the electrical system. Stockholders of the Metropolitan may subscribe at par for an amount equal to 45 per cent. of the par value of the capital stock of the Metropolitan Street Ry. Co., i.e., for $23,400,000 of the total $30,000,000.

It is provided that the Metropolitan Street Ry. Co. shall create a refunding mortgage to secure an authorized issue of $65,000,000 4 per cent. 100-year refunding bonds, of which about $54,000,000 are to be reserved to retire at or before maturity the various outstanding issues secured by liens upon the system (excluding the Third Avenue). The Interurban Co., as lessee, must provide the interest on these bonds, as well as other fixed charges, without impairment of the 7 per cent. annual payment on the capital stock.

Notice is given to stockholders that they will vote, March 20, on the lease to the Interurban Co., and the proposed bond issue.

Minnesota & Northern Wisconsin.—Mortgage has been made to the Minnesota Loan & Trust Co., of Minneapolis, trustee, to secure $200,000 bonds. The line has 38 miles in operation, with future extensions proposed. The bonds are gold 5s, and mature in annual payments until 1907, beginning Jan. 1, 1903. A balance of $50,000 is also reserved for extensions, and matures in 1908. A large tract of land in Beltrami and Hubbard counties secures the bonds, in addition to the railroad property.

Missouri, Kansas & Texas.—Additional St. Louis Division refunding mortgage gold 4s have been listed by the Stock Exchange, to the amount of $1,819,000, with permission to list $181,000 further, whenever issued in exchange for the remaining $137,000 of the $500,000 second mortgage bonds of the Missouri, Kansas & Eastern. A portion of the issue has been applied to betterments on the Division.

New York & Pennsylvania.—George R. Brown, of Canisteo, N. Y., has been appointed Receiver of this road by the courts of New York and Pennsylvania. The line extends from Canisteo to Ceres, 57 miles, and Mr. Brown has previously been Second Vice-President and General Manager.

Pennsylvania.—This company has taken over by purchase the Schuylkill & Juniata system, previously operated under lease. The Schuylkill & Juniata properties include the line from Philadelphia to New Boston, Pa., 101 miles; from Tomhicken to Sunbury, Pa., 43 miles; from Catawissa to Wilkesbarre, Pa., 43 miles; from Selingsgrove Junction to Lewistown Junction, Pa., 44 miles, and branches which bring the total to 469 miles operated.